GROW YOUR OWN

Complete HANDYMAN ENCYCLOPEDIA

23

CABBAGES
CURRANTS

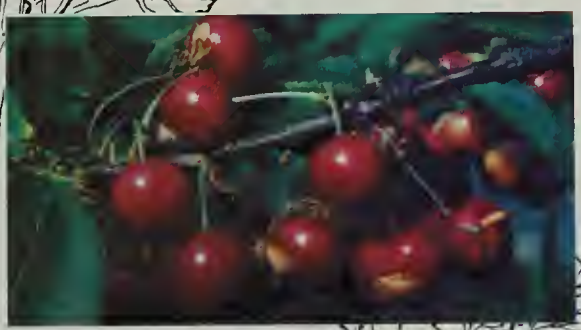
do-it-yourself

Complete
Handyman

do-it-yourself

Encyclopedia

do-it-



low yield

medium yield

high yield

minimum effort

needs more care

requires special attention

crops in three months or less

crops in 4-12 months

crops in over 12 months

Complete Handyman yourself Encyclopedia

A STEP BY STEP GUIDE TO SUCCESSFUL
VEGETABLE AND FRUIT GROWING
BASED ON ALL 52 GARDENING HANDBOOKS
PUBLISHED UNDER THE TITLE

VOLUME
23
CABBAGES
CURRANTS

H. S. STUTTMAN INC. *Publishers* **WESTPORT, CONN.**

© MARSHALL CAVENDISH LIMITED 1980
© MARSHALL CAVENDISH CORPORATION 1980

Based on the gardening handbooks
"GROW YOUR OWN"
Copyright © 1977
Marshall Cavendish Ltd.

PRINTED IN THE UNITED STATES OF AMERICA
3P(199)30-90

VOLUME . . . 23

CABBAGES
Suitable to most temperate climates and soils and needing minimal care 161
Nourishing SPRING CABBAGES are ready when fresh vegetables are scarce 173

CAPERS
Decorative plants producing buds for pickling and piquant flavoring 185

CARDOON
Blanched stems of these attractive thistlelike plants are delicious 186

CARROTS
Rich in calcium and vitamin A, this favorite vegetable is easy to grow 189

CAULIFLOWER
Delicate-tasting, the most versatile member of the cabbage family 204

CELERIAC
An undemanding and savory root vegetable, an excellent celery substitute 219

CELERY
Requiring rich soil and good cultivation, for gardeners who like a challenge 221

CHERRIES
Trees produce radiant spring blossoms and large crops of delightful fruit 234

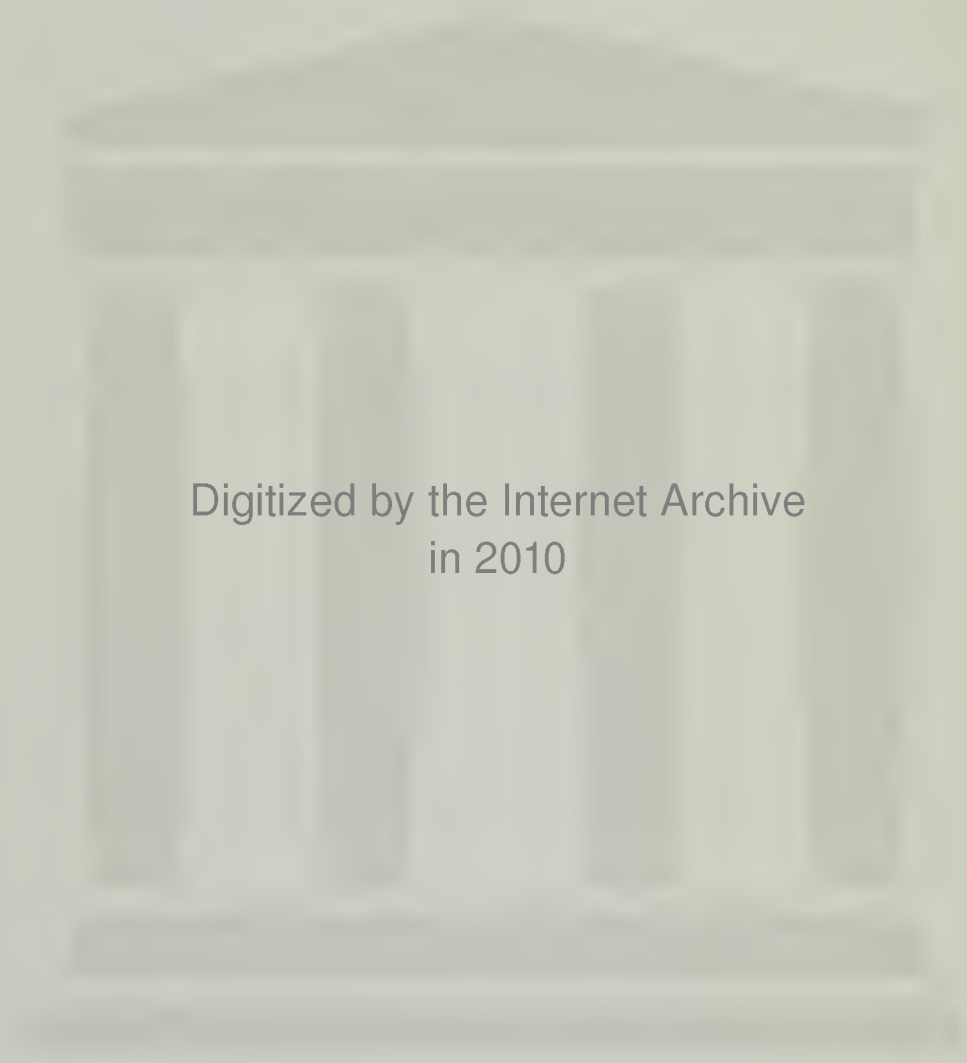
CHICORY
Becoming increasingly popular as an easy-to-grow, delicious salad crop 249

CHIVES
The distinct onionlike flavor enhances salads, soups, egg dishes, stews 260

CORN
One of the tastiest and most highly nutritious of garden vegetables 263

CUCUMBERS
A favorite salad vegetable that is at its best fresh from the garden 275

CURRANTS
BLACK CURRANTS are an easy soft fruit to cultivate in a moist climate 289
RED AND WHITE CURRANTS are excellent, tasty bush fruits for gardens 302



Digitized by the Internet Archive
in 2010

http://www.archive.org/details/completehandyman23newy

step-by-step growing guide

Cabbages

Brassica oleracea capitata (fam. *Cruciferae*) Savoy cabbages: *Brassica oleracea bullata major* (fam. *Cruciferae*)
Biennial grown as an **annual**
Sowing to harvesting time: 11–16 weeks for red and autumn cabbages; 15–20 weeks for winter cabbages; 14–17 weeks for early crop
Size: green and red varieties reach between 9–18 in (23–45 cm) high and 6–24 in (15–60 cm) wide; Savoys are about 8 in (20 cm) high and 20 in (50 cm) wide
Yield: for red and green cabbages about 6–10 per 10 ft (3 m) row, each head weighing between 2–8 lb (1–4 kg); Savoys yield about 8–9 per 10 ft (3 m) row, each weighing between 3–5 lb (1.5–2.5 kg)

Cabbages are extremely hardy members of the brassica family, thriving in cold, damp weather and capable of withstanding conditions which would destroy many other crops. Their suitability to most temperate climates and soils, and the minimal amount of attention they require, make cabbages one of the easiest crops to grow.

Spring cabbages, sown in summer, are a distinct group and will be dealt with in another article. Here we look at the types which can be sown from early spring to summer, for harvesting in summer, autumn and winter where weather permits.

Do not be deterred by the list of pests and diseases that can attack your cabbages; as long as you give your crop reasonable attention it should thrive.

The somewhat unglamorous reputation of cabbage has changed considerably over the last twenty years. Newer varieties are milder tasting than the old strong-flavored types, and disease resistant varieties have also been bred.

Suitable site and soil
Cabbages will thrive on almost any well-drained ground, but they prefer a medium-light soil which retains a reasonable amount of water. Prepare the soil with lime and apply manure at the rate of one barrow load per square yard (square meter) several months before sowing. If the ground has not been manured, apply a general fertilizer at the rate of 3 oz per sq yd (100 g per sq m) just prior to sowing.

A-z Collection

▲ *A row of healthy winter cabbages will soon be ready for harvesting.*

Choose an open, sunny site, and remember that cabbages must never follow any other brassicas because of the risk of disease being passed on.

Sowing the seed

Cabbages can be sown outdoors or under glass; the method is the same for both. The time of sowing depends on the variety, the climate and the time you want to harvest your cabbages. Plan a succession of sowings from early spring until early summer for a long period of cutting. Rake the seedbed to a fine tilth and prepare drills ½ in (1.5 cm) deep and 6 in (15 cm) apart. Sow at the rate of eight seeds per 1 ft (30 cm) outdoors. Cover with a layer of fine soil or peat.

For a mid to late summer crop, sow the seed thinly in late winter or early spring, indoors, in hotbeds or outdoors, according to climate. Plant into permanent positions in early to late spring, 12–15 in (30–40 cm) apart each way. The bed should be prepared in the same way as for winter crops. Protection may still be necessary if the weather is severe.

Cabbages grown outdoors should be transplanted when four or five cabbage-like leaves have formed.

Care and cultivation

Spring-sown cabbages do not require a great deal of care. Never allow them to dry out, as this will check their growth. Water liberally, especially during hot, dry weather. Hoe around the growing plants frequently to control weeds, to aerate the soil and to deter insect pests from laying eggs near the crop.

Some gardeners sow hyssop, a perennial herb, near the cabbage bed. It is supposed to be a protection against club root disease and to repel the cabbage white butterfly, and many gardeners swear that it works well.

Cabbages are greedy feeders, so during the growing period give applications of nitrogen or a liquid fertilizer. Top-dressings, particularly nitrate of soda,

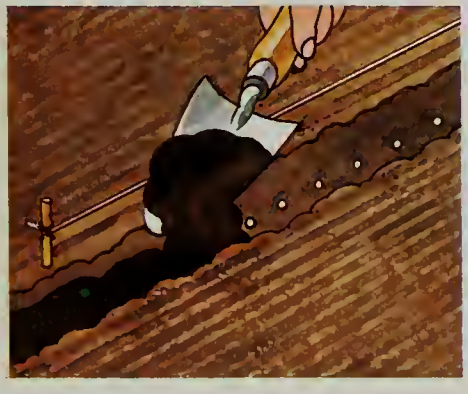
SOWING CABBAGE OUTDOORS

1. Prior to sowing, prepare the ground with an application of a suitable complete fertilizer.

2. Prepare the seedbed just before sowing by raking the soil to a fine consistency. The soil must be dry.

3. Using the side of a draw hoe blade, take out a narrow drill about 1 in (2.5 cm) deep and a few inches wide.

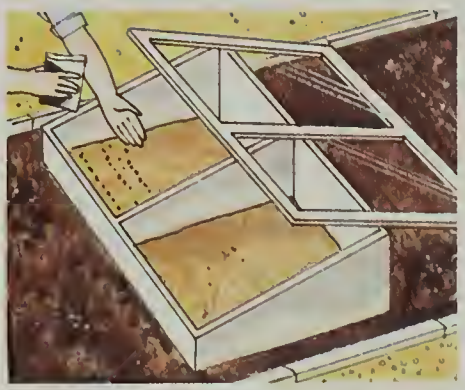
4. Cabbage seeds are large enough to sow individually. Space them in the drill about 8 seeds per 1 ft (30 cm).



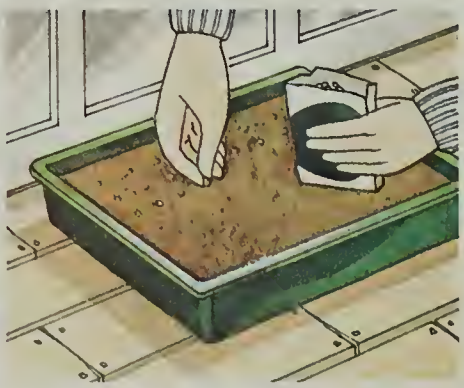
5. When the drill is filled, use a trowel to cover over the seeds with a thin layer of fine soil or peat.

6. When sowing is complete, use the back of a rake to smooth over and firm the surface of the seedbed.

GROWING UNDER GLASS



7. Cabbages are ideal for starting in a cold frame or hotbed. Prepare the seedbed and sow as for outdoor cabbages.



8. Sowings can also be made in the greenhouse. Sow in seedboxes filled with a good quality seed mixture.

Pat Brindley

▲ *Winter cabbages can be sown in growing bags which contain specially prepared soil mixes.*

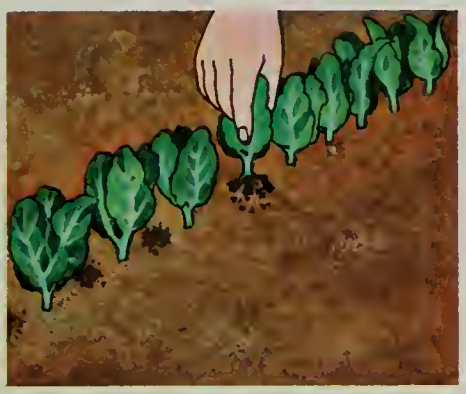
should be used gently on cabbages, as they can cause excessive growth.

As the plants mature, some outside leaves may turn yellow. Break off yellowing leaves as soon as you see them.

Harvesting and storing

Cabbages are ready for harvesting when the hearts are firm; lift the entire plant with a fork and cut the roots off later, or cut the stem with a sharp knife a little

CARE OF GROWING PLANTS



9. When one true cabbage leaf appears, thin the row of young cabbages to about 1 ft (30 cm) apart.

10. Before transplanting the seedlings, water the ground well using a fine rose on the watering can.

11. To transplant, dig a hole in the moistened ground, fill it with water, and gently place in the young plant.

12. Firm the ground around the transplants, and then water. Continue to water liberally as the plants grow.

13. Keep the cabbage patch free of weeds by hoeing frequently with the blade of a small Dutch or regular hoe.

14. Growing cabbage plants will benefit from an occasional watering with diluted liquid manure.

15. Cabbages are bothered by many insect pests, so an occasional dusting with insecticide will be helpful.

16. As the plants begin to mature, check them frequently and remove any yellowing outer leaves.

17. When the cabbages are ready for harvesting, loosen the soil and lift out the plants, roots intact.

18. Cut off the roots and stem, and remove any coarse outer leaves. Put these on your compost heap.

above the base of the lower leaves. Remove the outer leaves, which are much too coarse for eating, and put them on the compost heap.

Mature cabbages in good condition with firm hearts can be kept in a cool, airy, frostproof shed or cellar for many weeks. Place the cabbages on a rack made from wood or chicken wire. Do not stack them on the ground. If more convenient, cabbage can be preserved in your freezer, but will then be suitable for use only when cooked.

Aftercare

Once the cabbages have been cut, the crop is finished and the ground may be cleared. Burn the stems, or chop them up and add them to the compost heap, providing they are free of any pests or diseases. Alternatively, you can leave the stems in the ground over the winter to produce shoots again in the spring and provide another source of spring greens.

Red Cabbage

Red cabbages are usually grown as spring-sown varieties for autumn harvesting. Many people use red cabbage for pickling, but it is also delicious cooked simply and served hot. All red cabbage is round-headed, and a few may need a longer period for maturing than green spring-sown cabbages. The heads

Another method of harvesting cabbages is to pull back the outer leaves and cut the heart out.

Leave the stump in the ground. In time new shoots will grow and these can produce greens for cutting.

are rather smaller than most green varieties.

To have red cabbages ready for harvesting in autumn, sow the seed in an outdoor seedbed in midspring, and transplant to a cropping position as soon as four leaves have formed. Water well throughout the growing period, especially if the weather is dry, and follow the cultivation instructions for other cabbages.

The plants are ready for cutting when they are firm-hearted, usually from early autumn. Be sure to cut them before the frost can get to them, as they are not very frost-hardy. They will store for several months in a cool, dry, frostproof place.

Savoys

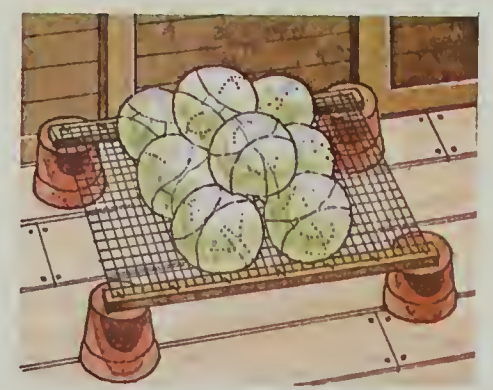
Savoys are extremely hardy cabbages with wrinkled, curly leaves. They tend to be rather mild in flavor, and for this reason many people prefer them to other spring-sown varieties. There are many different varieties of Savoys, and the range is wide enough to provide crops ready for harvesting from autumn to early spring when weather permits.

However, Savoys should never be grown in a city or in an area of high industrial pollution, since their deeply curled and crinkled leaves trap the soot.

Sow the seed in succession from early spring in a prepared seedbed. Savoys root less deeply than other cabbages, so they will grow well on less fertile soil and need less fertilizers added. Follow sowing instructions for winter cabbage. The site for final planting should be prepared with a hoed-in application of 2 oz per sq yd (60 g per sq m) of superphosphate and 1 oz per sq yd (30 g per sq m) of potash. Transplant the seedlings when they are large enough to handle and set them out at about 18 in (45 cm) apart. Cultivation is the same as for other varieties.

Harvest Savoys when they are firm-hearted. Remove the tough outer leaves and put them on the compost heap. If you want to store some, choose very firm ones and keep them in a cool, airy place. Some varieties will stay fresh for two to three months or more.

Store cabbages on a rack of chicken wire in an airy, frost-free place. They should keep for several weeks.



Exhibition tips

If you want to grow cabbages for exhibition, choose your varieties carefully for those suited to your soil and area. Think carefully about the timing of your sowing, so that the cabbages will be in prime condition for your particular show. You do not want your plants to mature too early and become wilted or tough before the event.

It is essential to keep exhibition plants completely free of pests and diseases, so take extra precautions. If the outer leaves become damaged, you can remove these before the damage goes any further, providing this does not make the shape asymmetrical. The leaves surrounding the heart must be perfect.

Cut the cabbages just before the show, as freshness will count high in the judges' marking. If the cabbages have matured too quickly, lift them completely when they are at their prime and hang them upsidedown in a cool dark place. Spray with water twice a day to prevent wilting or enclose in plastic.

Three perfectly-matched cabbages should be arranged on a plate at the exhibition hall. The judges will look for cabbages which are fresh and well-shaped with firm tender hearts.

Try hyssop (believed to repel cabbage white butterfly) as a companion plant.

Varieties

Green cabbages

All Seasons: 85 days. Stands hot weather. Good for South. Round head; 12 lb (6 kg). Good quality; late mid-season.

Autumn King: 63 days. Small, pointed heads. Sweet, fine flavored sort for home gardens; 2–3 lb (1–1½ kg). Very yellows-resistant.

Autumn Marvel: 90 days. Very uniform, compact, medium-sized head. Dark blue. Excellent storer; 3–4 lb (1½–2 kg).

Babyhead: 70 days. A miniature early Danish Ballhead type that stores well. Good space saver for the home gardener; 3–4 lb (1½–2 kg), larger in muck soils.

Canada Kraut: 66 days. One of best earlies for kraut and general use. Round, solid, blue-green; 4–7 lb (2–3½ kg); yellows-resistant.

Copenhagen Market: 70 days. Round-headed, vigorous; 7 lb (3½ kg). Resists bursting and keeps well but not yellows-resistant.

Danish Ballhead: 105 days. Long-season variety that makes extra hard, round heads; for salads, cole slaw or sauerkraut. Good keeper; 7–10 lb (3½–5 kg).

Early Flat Dutch: 85 days. A famous old second-early sort; heads large, flat and firm. A good keeper; 10–12 lb (5–6 kg).

Early Jersey Wakefield: 62 days. An old favorite early cabbage. Heads small, cone-shaped, good quality; popular for home culture.

Early Marvel: 65 days. Dark green, perfectly round, solid heads make this one of the most popular early varieties; heads 5 in (12.5 cm) and 3–4 lb (1½–2 kg).

Emerald Acre: 61 days. One of the best-tasting earlies; slightly smaller than Early Marvel. Resists bolting to seed.

Emerald Cross: 63 days. All-America. Heads uniform, round, compact; 7 in (17.5 cm) diameter. Vigorous, resists bursting, keeps well; 4–6 lb (2–3 kg).

Evergreen Ballhead: 98 days. Late, a good keeper, heavy yielder; heads round, resist mold in storage. 7–8 in (17.5–20 cm) and 8 lb (4 kg).

Harry Smith

▲ *Copenhagen Market*

Brian Furner

▲ *Golden Acre*

Brian Furner

▲ *Jersey Queen*

George Hyde

▲ *Savoy Ace*

Golden Acre: 64 days. Medium heads; quality good. Dwarf with few outer leaves. 6 in (15 cm), 3–4 lb (1½–2 kg).

Gourmet: 70 days. Yellows-resistant midseason; good; heads round, blue-green. 3–5 lb (1½–2½ kg), 6 in (15 cm).

Gurney's Giant: 105 days. Very large; 20–25 lb (10–12½ kg) common, larger exist. Excellent for cooking and kraut.

Harvester Queen: 60 days. All-America. Uniform, solid, vigorous, heat and disease resistant. 5 lb (2½ kg) and 7 in (17.5 cm).

Jersey Queen: 63 days. Early, fine flavor, sweet; heads small, pointed 2–3 lb (1–1½ kg). Ideal for close planting.

Penn State Ballhead: 100 days. Highly recommended for kraut, storage; heads solid, round, 6–7 lb (3–3½ kg).

Premium Late Flat Dutch: 105 days. One of best late, flat sorts; inside white, crisp and tender. Good keeper, 12–14 lb (6–7 kg) up.

Princess: 66 days. Popular early hybrid; resists yellows. Round, matures before Stonehead; 3–4 lb (1½–2 kg) and 6 in (15 cm).

Storage Green: 95 days. A short-stemmed Evergreen Ballhead; yellows-resistant. Medium-large, round, closely wrapped; keeps well. 8 lb (4 kg).

Stonehead: 60 days. All-America. Small, 6 in (15 cm), very solid, non-bolting and yellows-resistant; good for spring and summer sowing. 3–4 lb (1½–2 kg).

Ultra Green: 99 days. Dark green, late fall; still has good color after 7 months in storage. Excellent for slaw or kraut.

Brian Furner

▲ *Harvester Queen*

Brian Furner

▲ *Red Acre*

Hurst, Gunson, Cooper, Taber Ltd.

▲ *January King*

Brian Furner

▲ *Savoy King*

Red cabbages

Mammoth Red Rock: 100 days. Flavor excellent; popular for pickling and boiling. Purple-red, flattened, very solid; productive, keeps well, 6–8 lb (3–4 kg).

Red Acre: 75 days. Early, deep red, medium-sized; resists splitting, a good home garden sort. 4–6 lb (2–3 kg).

Red Head: 85 days. High quality, vigorous and yellows-resistant; heads solid.

Red Storage: 98 days. Most popular red abroad; excellent quality.

Ruby Ball: 68 days. All-America. Extra early, dark red, firm; stands long in garden without bursting. Small cored and good cooked or raw.

Storage Red: 96 days. Globe-shaped and heavy yielding; stores well, holding color better than most, upright grower.

Savoy cabbages

Chieftain Savoy: 83 days. Dark olive green and well savoyed; high quality and non-bursting. 4–5 lb (2–2½ kg).

Ice Queen: 80 days. Dark green; small heads well crumpled, 3–4 lb (1½–2 kg).

Improved American Savoy: 85 days. Top flavor, good size, deep green, densely crumpled; plant late, frost improves it.

January King: 86 days. One of hardiest; large, round, solid; slight red tinge.

Perfection Drumhead: 90 days. Large, round, excellent quality; retains color.

Savoy Ace: 75 days. All-America; early, takes half usual space. Dark, crumpled, thick, juicy, resists yellows. 6 in (15 cm).

Savoy King: 88 days. Medium large, 5 lb (2½ kg); dark green, mild, tender. Vigorous; stands summer heat, winter cold.

Pests & Diseases

Cabbage aphid: This is a gray or gray-blue aphid which infests the undersides of leaves, from midspring through to winter. The eggs will winter in debris. Treat by spraying with derris, malathion or Sevin.

Cabbage root fly: spring-sown cabbages are particularly at risk because the flies are most active in midspring to early summer. The adults lay their eggs against the cabbage stems, and the maggots hatch and burrow into the stem and devour the roots. The cabbages wilt and die. Lift and destroy any infested plants. An attack can be prevented by dusting the ground with diazinon at the time of planting and again about two weeks later.

Cabbage white butterfly: cabbages in the ground in summer and autumn are liable to attacks by the caterpillars of the cabbage white butterfly. The adults lay eggs on the cabbage leaves, and the caterpillars hatch out and rapidly devour the plants. If unchecked they can destroy much of the crop. Do not wait until caterpillars are seen to take action. If you see any butterflies, spray the plants with a non-poisonous insecticide such as Sevin or malathion. Check the cabbage leaves for any yellowish oval eggs, and remove and destroy them. Should you see any of the yellow-striped green caterpillars, remove them by hand and spray the plants again.

Cabbage moth: moth larvae can also attack. The moths are nocturnal and rarely seen, so be on the lookout for their large, round eggs, laid from midspring to midsummer. The smooth green caterpillars hatch out and burrow into the hearts of the cabbages, destroying them. Remove any eggs by hand, and spray the plants with Sevin or malathion. Remove and destroy any caterpillars that hatch.

Cabbage white fly: this pest attacks all members of the cabbage family. It is usually a problem during warm weather, although attacks during midwinter are not unknown. The females lay their eggs on the undersides of leaves, and the flat, scalelike larvae remain attached to the leaves. The secretions of the larvae encourage the formation of sooty molds, and the cabbages are very quickly destroyed. Prevent a white fly attack by spraying with a locally approved insecticide at the first sign of the insects. Remove and burn any infested leaves, and spray the undersides of the remaining leaves with a soft soap solution.

Flea beetle: colonies of small, black flea beetles can decimate seedlings and young plants by biting small round holes in the leaves. The crop can be completely destroyed before it has even started to grow. To prevent an attack, dust the leaves of young plants with derris. Hoe around the plants to disturb the beetles and stop egg-laying.

Brian Furner

▲ *Holes in a head of cabbage caused by the caterpillars of the cabbage white butterfly.*

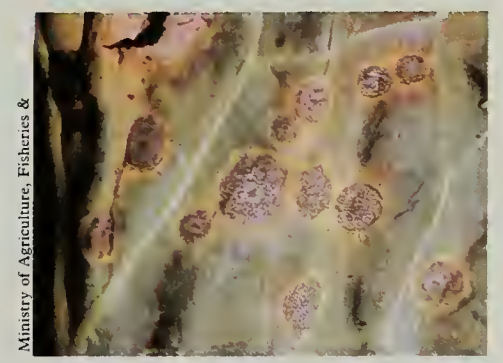
K. M. Harris

▲ *Adults and larvae of the cabbage white fly. Eggs are laid on the undersides of leaves.*

GUIDE TO CABBAGE TROUBLES

Symptom	*Probable cause*
Maggots in stems	Cabbage root fly
Holes in leaves	Cabbage white butterfly caterpillar Cabbage moth caterpillar, Flea beetle
White larva on undersides of leaves, distorted roots	Cabbage white fly, Club root
Wilting leaves	Cabbage root fly, Club root
Rotting stems on seedlings	Wirestem
Brown spots on leaves	Ring spot
White fungus on undersides of leaves	Downy mildew

Club root (finger and toe): this is the most serious cabbage disease the home grower is likely to encounter. It is caused by a fungus which infects the roots. The first signs of infection are wilting, blueish leaves and dying plants. The roots are swollen and distorted so that they have a clublike appearance. This occurs most frequently on heavy soils which have not been sufficiently limed, so lime the soil before sowing to make it nearly neutral. Attacks also occur on wet, badly drained soils, so be sure that drainage is sufficient before planting. Treating the seedbed and planting holes with approved controls is also a useful precaution and cabbage transplants can be protected by dipping their roots in water containing a fungicide before planting. The fungus is soil-borne so if an infection occurs, remove and burn all plants and do not use the site for brassicas for five years.



Ministry of Agriculture, Fisheries &

▲ *Round brown spots and yellowing leaves caused by the fungus infection ring spot.*

Brian Furner

▲ *Young cabbage plants which have been badly infected by the disease club root.*

Wirestem: Wirestem fungus attacks the seedlings, causing the bases of the stems to turn brown and wither. The seedlings either die or grow into poor, stunted plants. Wirestem can usually be avoided by sowing the seed in well-limed soil or in sterilized compost.

Ring spot: this is a fungus disease which attacks older plants and produces round brown spots about ½ in (1.5 cm) in diameter on the leaves. The infected outer leaves turn yellow, and the inner leaves will also gradually become infected. Remove any diseased leaves as soon as you see them, and prevent further infections with a light dressing of potash fertilizer to harden the growth.

Downy mildew: this disease appears as patches of white fungus on the undersides of the plants. Yellow spots may also develop on the upper leaf surfaces. Destroy affected plants while young.

Spring Cabbage

Brassica oleracea capitata (fam.*Cruciferae*)
Biennial grown as an **annual**
Sowing to harvesting time: 13–20 weeks
Size: 9–18 in (22.5–45 cm) high and 6–24 in (15–60 cm) wide
Yield: about 8–12 cabbages, depending on variety and when they are harvested, per 10 ft (3 cm)

Cabbages are the most widely grown of all brassicas; they are hardy, have minimum cultivation requirements, and give good steady supplies of nutritious vegetables right through the year. There are many different varieties available, round or conical in shape, with a great range of color and texture. All are rich in vitamin C, and many of the newer varieties are milder tasting and more disease resistant than the old types. Cabbages can be cooked or made into cole slaw or sauerkraut.

Among the oldest of vegetables, cabbages are thought to have been part of the human diet as early as 2,000 B.C.

For ease in planning your garden and crop rotation, cabbages are divided into two basic groups according to when they are harvested. Cabbages sown in the spring are harvested the following summer, autumn or winter.

Spring cabbages are sown in the summer or fall and harvested the following spring in the South, Southwest and areas on the West Coast. They are particularly welcome in early spring, when fresh vegetables are scarce in the garden and expensive in the shops. Spring cabbages have been bred specifically to withstand winter weather and produce good heads without bolting in spring. You can also grow them to produce "spring greens," small leafy cabbages without hearts, by growing them closer together.

There are, however, one or two exceptions to this general rule. Some varieties can be sown all year round in parts of California with good results. Savoys, which are usually considered winter cabbages, are sometimes sown in late summer and cultivated as if they were spring cabbage.

Do not be put off by this seemingly complicated system. If you are not absolutely sure whether a particular variety will give good results when grown as a spring cabbage in your area, try to get some advice based on local experience, by checking with other growers or market gardeners.

Brian Furner

Cabbages are particularly welcome in early spring, when other vegetables are scarce.

Suitable site and soil

Unlike most other cabbages, which like an open site, spring cabbages need some shelter from winter weather. Although it may vary locally, the worst winds usually come during this season. So try to site the bed accordingly.

A sunny site is best; however, it is not a crop which should be pampered. If the site is exceedingly sheltered and warm, the young plants will grow too lush and then be harmed by the first hard frost. If they are not then killed outright, they may bolt, or run to seed, instead of producing good heads.

These cabbages need a light, well drained soil; waterlogging during winter can be fatal. If the soil is very heavy, you can grow the crop on ridges or mounds.

As part of a crop rotation plan, spring cabbages can follow peas, lettuce, potatoes or early beans. As with all members of the brassica family, spring cabbage must never follow another brassica, to avoid the risk of soil-borne diseases being passed on. Don't overcrowd; the more light and air, the better the crop.

Avoid planting spring cabbage on freshly manured soil, as this may encourage lush, vulnerable growth. Ideally, use

SOWING

1. During hot dry summers, water the site heavily a week before sowing; make sure the soil is thoroughly wet.

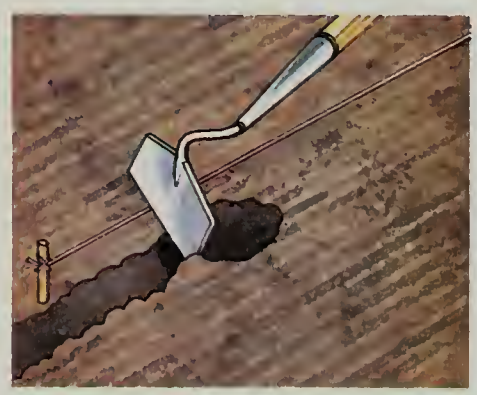
2. For sowing in either prepared seedbed or permanent bed, rake the soil to a fine even tilth.

a site which has been deeply dug and manured for a previous crop. If this is not possible, apply a slow-acting organic fertilizer according to the manufacturer's instructions just before sowing.

Sowing

Because weather conditions vary from year to year, and also from place to place, it is difficult to fix an exact date for sowing. Ideally, you want plants which are strong enough by late autumn to survive winter weather. If they have been planted too early and have grown on too much, they may bolt when the weather warms up. If, however, they have been sown too late in the season, they will be vulnerable to pests, diseases and winter weather, and unlikely to give a reasonable crop. Generally, spring cabbage should be sown from the beginning of late summer into the fall, according to your local conditions. It is safest to make two sowings, the second one about two weeks later. In this way, unexpected changes of weather would be less likely to ruin the entire crop.

If spring cabbage is sown at a time when it is hot and dry, watering before sowing may be necessary to avoid failures in germination or weak, disease-prone seedlings. If it has been a hot summer, water the site heavily a week before sowing. Just before sowing, water again so that the top 3 in (7.5 cm) of soil is moistened.



3. Make the drills ½ in (1.3 cm) deep; space seedbed rows 6 in (15 cm) apart, space permanent bed according to variety.

You can either sow the seeds in a prepared seedbed or sow them in the permanent bed. In both cases, rake the bed to a fine tilth and prepare drills ½ in (1.3 cm) deep. For a seedbed, make the rows 6 in (15 cm). If you are sowing them into the permanent bed, make the spacing between rows 15–18 in (37.5–45 cm) apart for heading cabbage, depending on variety, or 1 ft (30 cm) apart for spring greens. Sow the seeds thinly, at the rate of eight seeds per 1 ft (30 cm). After sowing, tamp down the rows firmly. Rake over the sown bed; spread flea

SOWING

4. If the soil is dry, give a final watering to enable the seeds to germinate quickly and easily.

5. The seeds are large enough to sow individually; sow about 8 seeds per 1 ft (30 cm) of row.

6. When the drill is filled, use a trowel to cover over the seeds with a thin layer of moist soil or peat.

7. When sowing is complete, use the back of a rake to smooth over and firm the surface of the seedbed.

beetle dust as a precaution against these pests, and mulch with grass mowings to keep weeds down and retain moisture.

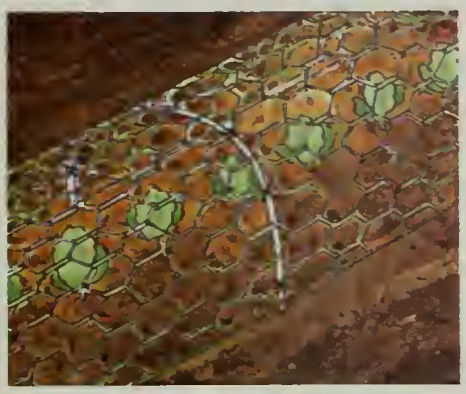
Thinning and transplanting

Thin seedlings which have been sown in the permanent bed as soon as they are large enough to handle. The distance between plants depends partly on the variety, and partly on whether you plan to harvest the crop as immature spring greens or when they have matured and formed heads. For smaller varieties, and those you wish to pull as spring greens, leave 12 in (30 cm) between plants. If you want them to grow on and produce heads, leave 18 in (45 cm) between plants. If you have sown two batches, one two weeks later than the other, put in the older plants first, spaced 2 ft (60 cm) apart. Then interplant with the young plants about two weeks later.

Cabbages sown in a seedbed should be transplanted when they have four or five leaves. In some areas you can leave the young plants in the seedbed through winter and transplant next spring.

Try to transplant during showery weather. If the weather is dry, water both the plants and the permanent bed thoroughly the day before transplanting. If your soil is acid, it is a good idea to

TRANSPLANTING



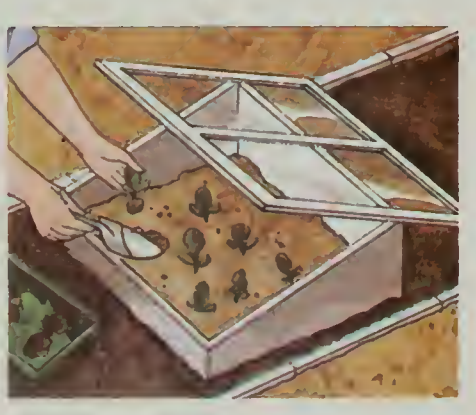
1. Birds, particularly pigeons, can be very destructive; netting seedlings is the best solution.

2. Thin the seedlings when the true cabbage leaves appear; thin to between 1-2 ft (30-60 cm) apart.

3. If you are transplanting in dry weather, water the plants and the permanent bed thoroughly.

4. If your soil is acid, lime the permanent bed, so the soil reaction is nearly neutral. This is to discourage club root disease.

5. Lift the young plants with a trowel; transplant them into a hole larger than the root ball.



6. When transplanting the crop, plant a few extra in a cold frame, to use as replacements if any die.

CULTIVATION AND CARE

1. Apply flea beetle dust as a precaution against flea beetle; apply again as necessary.

2. Hoe lightly to keep weeds down; this also aerates the soil and deters insects from laying eggs.

3. Make sure the plants do not run short of water during the autumn; continue watering as necessary.

4. In late autumn, mound up around the plants, making a continuous low ridge; this gives winter protection.

5. If the site is very exposed, try some sort of protection from late autumn through to spring.

6. After severe winters, apply quick-acting nitrogenous fertilizers to encourage spring growth.

lime the permanent bed, so that the soil reaction is near neutral, to discourage club root, which seems to be associated with acid soils. Fork the ground over lightly; the firmer the ground the less likely the plants are to bolt.

When transplanting, lift the young plants with a trowel, leaving plenty of soil around the roots. Dig a hole large enough to accommodate the root ball and fill it with water. Gently place the young plant in the hole, and as the water is absorbed into the soil, firm the ground around the transplants.

As a safeguard, you can plant a few extra young cabbages in a cold frame when you are transplanting the crop into its permanent bed. If there is a very severe winter, or some of your plants in the main bed are killed by disease, you can replace them in spring with these additional plants.

Care and cultivation

Unlike summer and autumn-harvested cabbage, spring-harvested cabbage should not be given applications of fresh manure, or other organic or chemical fertilizers rich in nitrates. This is because nitrates cause rapid, lush leaf growth which is vulnerable to winter weather and leads to bolting in spring. The only exception is if the plants have suffered a severe setback from harsh winter weather. They will need quick-acting nitrogenous fertilizers to enable them to recover and produce reasonable crops. Apply at the rate of 1½ oz per sq yd (45 g per sq m) in late winter, with, possibly, a second application a month later.

Generally, cultivation is straightforward. Hoe lightly to keep weeds down; this also aerates the soil and deters insect pests from laying eggs near the plants. Hyssop is sometimes grown as a companion plant for cabbages, as its aroma is said to repel cabbage white butterflies. If your garden is troubled by this pest, try growing hyssop as a deterrent.

Birds, particularly pigeons, can be destructive, quickly stripping the leaves of young plants. Protect the plants with wire netting if necessary

In late autumn, earth-up around the plants, making a continuous low ridge. This helps drain surplus water away from the stalks, and also helps stabilize the plants against winter winds. If the site is very exposed, and you have plastic tunnels available, try them to give the plants protection from late autumn through to midspring.

Harvesting

Spring cabbage can be harvested at three different stages of development. The immature cabbage, or spring greens, can be pulled before a head has formed, usually in late fall or early or midspring. These early pickings are also a form of thinning; if you have planted them closely together and take out alternate plants, those remaining will have room to grow to their full size.

In winter or spring, the cabbages should be ready for picking. There are two methods of harvesting. If you want to clear the ground as you harvest, lift the plant, complete with roots, with a fork. Cut off the stem and the rough outer leaves with a sharp knife; these can go on the compost heap if the crop has been pest- and disease-free. The stem and roots will need smashing with a hammer first.

Alternatively, if you want additional spring greens after the heads have been used, harvest the heads by cutting them off the stalk, leaving the outer leaves still on the plant. Cut the stump crossways across the top and it will sprout again in time, giving a second or even third crop of tender greens, depending on the weather and other conditions.

Exhibition tips

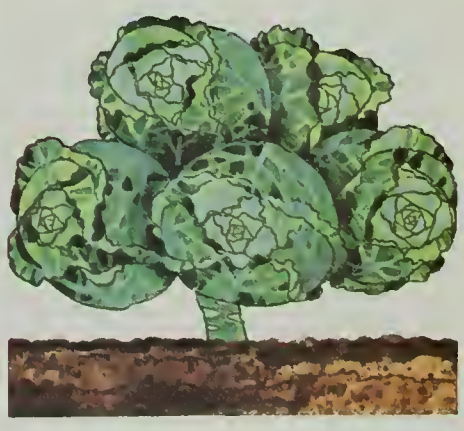
The problem with exhibiting spring cabbage is one of timing. Normally, summer or fall shows occur at the same time as cabbage seeds are being sown for the following spring's crop; the previous year's crop will have finished months ago, If, however, you have occasion to show spring cabbage, it is judged in much the same way as summer and winter cabbages.

HARVESTING

1. When the cabbages are ready for harvesting, loosen the soil and lift out the plants, roots intact.

2. Cut off the roots and stem, and remove any coarse outer leaves. Put these on your compost heap.

3. For additional greens, leave stumps in the ground. Make a shallow cross cut on exposed stalk surface; new cabbages will grow from the stump.



Three cabbages is the usual number shown. The judges will look for solid, symmetrical and shapely hearts, absolutely free from pests and diseases. If the outer leaves are tough or damaged, you can carefully cut them off before the show, as long as the cabbages do not look misshapen as a result. Also, all three cabbages should have the same amount of leaf removed, so that they are as uniform as possible.

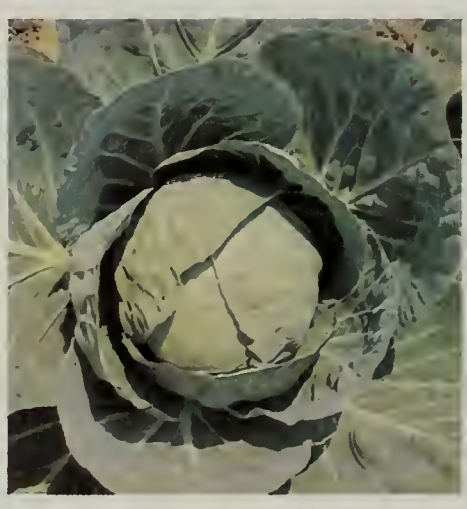
Enormous sized heads are not necessarily prizewinners. The size will be related to the variety grown; small growing varieties will not be penalized. In some shows, judges may cut one of the cabbages in half and inspect it. A moderate sized cabbage with firm, tightly packed inside leaves will gain more points than a huge specimen with flabby, loose inside growth. The inside leaves should be much paler than the outer green ones, with the bases of the leaves packed close together. Elongated stems or flowering spikes are considered defects, as are split, tough or especially soft hearts.

Storage

Since spring cabbage is harvested at a time when temperatures begin their upward trend, it cannot be stored for too long in most parts of the country. Temperature in a trench, pit or outdoor cellar must be kept as near 32° F (0° C) as possible, with moderate humidity, to maintain quality and freshness.

Brian Furner

▲ *April Green*



Brian Furner

▲ *Golden Acre*

Varieties

April Green: popular Dutch variety sold in the United States, Canada. Heads large, solid; for kraut, cole slaw, cooking. Spring cropper.

Autumn Marvel: heads uniform, medium size; matures late. Yellows-resistant.

Emerald Cross: All-America winner; round, tight, compact. Medium heads, heavy yielder; also recommended for South.

Christmas Drumhead: from England; very hardy, dwarf, compact. Good in small gardens.

Golden Acre: widely grown; yellows-resistant. Firm, round; good texture, flavor.

Hispi: new, can be grown almost year round. Heads pointed, uniform, sweet. Fast grower.

Ice Queen: savoy type from Holland; heads small. Leaves dark green, well crumpled; good for small spaces.

Harry Smith

▲ *Hispi*

Brian Furner

▲ *January King*

Pat Brindley

▲ *Savoy King*

January King: hardy winter variety; crisp, crunchy, well-flavored. Stores well, too.

Jupiter: very hardy; heads very solid, well protected. Harvests over long time.

Savoy King: All-America and British medal winner. Produces crop every season. Outyields other savoys.

Ultra Green: good winter sort. Excellent color, texture, flavor; extra long keeper.

Other early varieties are Stonehead, Ruby Ball and Marion Market.

Brian Furner

▲ *Durham Early, an English variety.*

Pests & Diseases

Cabbage aphids: these small gray pests infest the undersides of leaves, from midspring onwards. They are particularly prevalent in hot dry summers following mild winters. Infested leaves will become curled, twisted or discolored, and very young plants can be killed outright. A good preventative measure is to dig up and burn all stumps of cabbages and sprouts after final harvesting; do not leave them in the ground or put them on the compost heap for aphids to feed on. In severe cases, spray with rotenone, pyrethrum or Sevin to destroy the adults and prevent them from laying eggs.

Cabbage maggot: although these pests are most active in midspring, three generations are frequently produced in one season, and autumn-sown crops can sometimes be attacked. The legless maggots attack the roots first, and later tunnel into the stems. The aboveground symptoms of cabbage maggots are wilted, grayish-green leaves; below the ground the cabbage roots are swollen. Remove and burn any infested plants, as well as the soil immediately around the roots. A good preventative measure is to treat the soil with diazinon granules when sowing.

Cabbage white butterfly: because these pests often produce five or six generations a year, they can be troublesome a long while. The green caterpillars feed on the leaf tissue and can quickly destroy young plants. Do not wait until you see the caterpillars to take action. As soon as you see cabbage white butterflies, spray the plants with malathion or Sevin. If caterpillars do appear, remove them by hand from the leaves and spray the plants again.

Cabbage moth: although the main damage is done earlier in the summer, several broods of caterpillars are sometimes produced in a season and can severely damage young cabbage plants. Treat-

Royal Horticultural Society, Wisley

▲ *Cabbage aphids quickly form large colonies; young plants can be severely damaged.*

National Vegetable Research Station

▲ *Caterpillars of the cabbage white butterfly feed on leaves and can quickly strip them.*

ment is the same as for cabbage white butterfly.

Cabbage white fly: these look like little moths and attack all members of the cabbage family. They are particularly troublesome in warm weather, when the adult flies and larvae feed on the underside of the leaves. Besides sucking the sap, they secrete honeydew, which encourages sooty mold. Spray with a new white fly insecticide as soon as the pests are seen; remove and burn badly infested leaves.

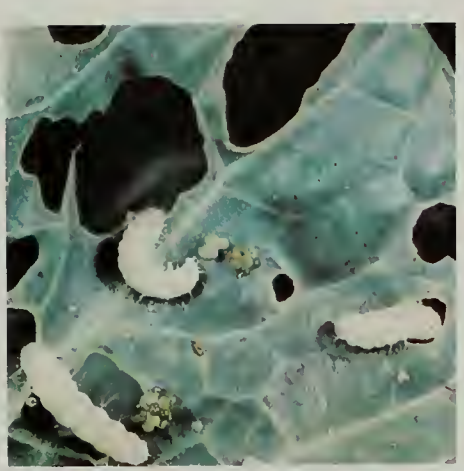
Flea beetle: if the leaves of young plants are punctured by many small round holes, then flea beetle is the probable cause. In severe cases, plants will be completely defoliated and die. To control an attack, spray with Sevin.

Wireworm: the long, shiny yellow larvae of the wireworm live in the soil and attack plant roots. They are worse in weedy, neglected gardens or those which are newly cultivated from grassland. A good precaution is to keep your garden well cultivated, and hoe frequently between the plants. This keeps the weeds down and exposes the wireworms to insectivorous birds. If necessary, apply a control recommended by your state university.

Club root: this very serious disease is usually associated with wet, badly drained soils, or those which are very acid. Symptoms above ground are bluish, wilting leaves and dying plants. The roots, when dug up, will appear swollen, black and distorted, and may have an unpleasant odor. To help prevent club root, test your soil before sowing; if it is acid, apply lime at the suggested rate to make it nearly neutral. For approved preventive measures, consult your state university. If your plants are infected, dig them up and burn them; do not use the site for other brassicas for at least five years.

Blackleg: the same fungus which causes damping-off in young seedlings also causes blackleg. Infected plants wither and turn brown at the base. If they do not die outright, they are likely to remain stunted. A good precaution against blackleg is to sow the seed in sterilized soil or sterilized compost. Consult your state authorities for an approved control.

Downy mildew: the symptoms of this fungal infection are downy white patches on the undersides of the leaves; infected leaves then turn yellow and wilt. Remove and destroy badly infected leaves; spray the remainder with an approved fungicide.



Murphy Chemicals

▲ *Cabbage moth caterpillars: besides eating the leaves, they foul them with excrement.*

Ministry of Agriculture, Fisheries and Food

▲ *Powdery mildew: though a relatively rare disease, this parasitic fungus can be serious.*

Cabbage may also be subject to attack by cutworms. These pests eat through young shoots at ground level, feeding mostly at night. During the day they hide, usually just under the soil. To help prevent cutworm destruction, protect cabbage seedlings with a collar set about an inch into the ground. If you do not have pliable cardboard for this purpose, you can use paper cups with the bottoms cut out.

Tarnished plant bugs are another possible problem for cabbages. They inject a substance into plants, causing leaf tips and stem joints to become blackened and deformed. Garden debris harbors them during the winter and they emerge in spring.

Among plant diseases, cabbage may also be affected by cauliflower mosaic virus. The disease is transmitted by aphids and results in leaves becoming mottled with yellow and plants failing to grow to normal height.

Both pests and diseases are more controllable now than ever before with chemicals, but you should begin with preventive measures. This would include using disease-resistant varieties and treated seeds, destruction of infected plants, crop rotation and keeping gardens free of weeds and debris all year round.

GUIDE TO SPRING CABBAGE TROUBLES

Symptom	*Probable cause*
Curled, twisted, discolored leaves	Cabbage aphid
Swollen roots, wilted leaves	Cabbage maggot
Holes in leaves	Cabbage white butterfly caterpillar Cabbage moth caterpillar Flea beetle
Roots eaten	Wireworm
Wilting leaves, swollen disfigured roots	Club root
Stems turn brown and wither at base	Blackleg
Downy white patches on undersides of leaves	Downy mildew
Flies and larvae on underside of leaves; honeydew secretions which encourages sooty mold	Cabbage white fly

growing ideas

Piquant Capers

Capers are expensive to buy, but relatively cheap to grow in a cool greenhouse and the plants are extremely decorative.

The common caper (*Capparis spinosa*) is cultivated as a small-scale commercial crop in Sicily, southern France and the southern United States, and it is capers from these crops which you buy pickled in small jars for your pizzas and sauces. But if you have some room to spare in your cool greenhouse, you might like to try to grow one or two of these small, spiny, evergreen shrubs.

The edible part of the caper plant is the unopened flower bud; these are gathered and pickled in wine vinegar. Although you will never see the flowers, they are extremely beautiful, with white petals and rose-purple stamens. The caper plant is not difficult to cultivate as long as you remember that it is a sun-lover and must have plenty of sunlight throughout the year for a plentiful supply of buds. It is not at all frost-tolerant, so you must be able to maintain a winter temperature above freezing.

Capers are grown from seed, usually available from the leading seedsmen. Sow the seed in midspring in a tray filled with a friable seed mixture. Cover the tray with glass or heavy plastic and keep it in a warm place. For germination to occur, the temperature should be maintained at no lower than 64° F (18° C). Remove the cover after germination, usually in about three weeks.

Move the young plants into pots singly when they are about 2 in (5 cm) high. Fill 3 in (7.5 cm) pots with a good friable potting mixture and place one plant in each pot. Be sure the pots have good drainage, and never allow the soil to become waterlogged or to dry out.

As the plants develop, pot them twice more, first into 5 in (12.5 cm) pots, and finally into 8 in (20.5 cm) pots. The potting mixture should be increased in strength as well.

The shrubs will branch out naturally as they grow, but you can also help this along by occasionally pinching back the tips of the shoots. Keep the plants well watered. Little water will be required between late autumn and early spring, when the plants rest and lose a few of their leaves, and feeding is not necessary at all at this time. When growth begins again in midspring, prune back long shoots to leave two or three buds only and increase the watering. Feeding can start toward the end of late spring.

Aphids may attack the tips of the shoots and young leaves, so if they are present in your greenhouse, a spraying with rotenone will be beneficial.

You can propagate capers from cuttings during the summer months. Cut the tips off new, young shoots with three or four leaves and insert three or four around the edge of 3 in (7.5 cm) pots filled with a mixture of moist peat and sand. Cover the pots with blown-up, clear plastic bags, keep the mixture moist, and put them in a warm, 65–70° F (18–21° C), shaded place. It is wise to replace the old plants every few years.

Capers will not "crop" until they are two years old. The shrubs will begin to flower in late spring. Check the plants daily for mature but still unopened flower buds. Gather them each morning and immediately pickle them in salt and strong wine vinegar.

A Garden Aristocrat

A highly unusual vegetable for the adventurous gardener, the cardoon is a large, handsome plant which yields delicious stems after blanching.

If you want a decorative and interesting plant to grow in your garden, try cardoons. These very attractive thistlelike plants resemble their close relative the globe artichoke, but they are much hardier, and also prettier. Although they are often grown at the back of the flower garden solely for their appearance, this is a pity, as the blanched stems are quite delicious. Because they take up a relatively large amount of space for the crop yielded, and because they require blanching, cardoons are very rarely grown commercially. It is much more popular as a vegetable in Mediterranean countries, and is often seen there growing in gardens. If you have room for it, it is well worth trying either in the vegetable or the flower garden; the large ornamental foliage, silver gray in color, is most attractive.

A native of southern Europe, the cardoon (*Cymara cardunculus*) is a hardy herbaceous perennial, although it is usually grown as an annual. The generic name, *Cynara,* comes from kynon, the greek word for dog, as the plant produces numerous spines which look like dogs' teeth. It is usually the stems which are eaten, and these must be blanched like celery. However, the flower buds can also be cut and cooked, making this a doubly good choice for the gourmet gardener.

To grow cardoons, choose a site in your garden which gets plenty of sunshine and warmth. The soil should be rich and moisture-retentive; if your soil is dry, grow your cardoons in trenches.

Cardoons are grown from seed, sown in mid to late spring, or you can raise young plants from seed sown in early spring in a heated greenhouse or on a windowsill. If the ground is cold, you should sow the seeds in pots under glass. Fill 3 in (7.5 cm) pots with potting soil and sow three seeds in each one. Thin to the strongest seedling when they are large enough to handle, and repot them into 5 in (12.5 cm) pots, if necessary. Plant the young cardoons in their permanent positions when the ground has warmed up at the end of late spring, spacing them 1½ ft (45 cm) apart.

If you decide to sow the seed outdoors, wait until late spring, and be sure the soil is quite warm. Prepare trenches 1 ft (30 cm) deep and 1½ ft (45 cm) wide, as for celery. Add a 3 in (7.5 cm) deep layer of well-rotted manure or garden compost mixed with the soil, and allow it to settle in the bottom of the trench. There should be a hollow for retaining water. The trench method is the best way of making sure of a good cardoon crop, unless you are sure your soil is quite heavy and wet.

Sow the seed in the trench in groups of three or four seeds placed at 1½ ft (45 cm) intervals. They should be about 1 in (2.5 cm) deep. Unfortunately, mice and other small animals have a liking for cardoon seed, so place an inverted flowerpot over each group of seeds. Remove the flowerpots as soon as the seeds sprout, and thin to the strongest seedling when the plants are about 2 in (5 cm) high.

Harry Smith

The cardoon's attractive foliage makes it an excellent choice for the ornamental border.

Cardoons require a great deal of water, so watch your plants carefully and never allow them to dry out. Water them well and frequently, and flood the trenches in very dry weather. To prevent the soil from becoming a heavy, solid mass, aerate it and remove all weeds by regular hoeing. At the end of midsummer, mulch with moist horticultural peat or well-rotted garden compost, and begin to feed weekly with diluted liquid fertilizer. When it reaches a height of 1 ft (30 cm), it will be necessary to stake each plant.

Blanching should begin in late summer or early autumn. Remove all dead or yellowing leaves, and bunch the remaining leaves together so that you can tie them with twine. Cut long strips of thick brown paper about 6 in (15 cm) wide, and wrap these around the plant, starting at the bottom and finishing so that the topmost leaves emerge from the paper. Alternatively, use strips of black polyethylene cut to the same width. Earth-up soil around the tied-up plants to make doubly certain that all light will be excluded. The blanched stems will be ready to eat in six to eight weeks.

A quicker blanching method will produce stems in four weeks or less, but it is more painstaking to do. This involves covering the stems with layers of straw 4 in (10 cm) thick, and then tying this

Brian Furner

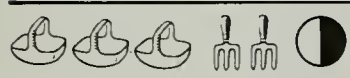
←Cardoons wrapped in black polyethylene for blanching. Brown paper or clean dry straw are other materials used to exclude light, and earthed-up soil around the paper or plastic will give additional protection against light reaching the leaves. Depending on the blanching method used and weather conditions, the pale chards will be ready for picking from four to eight weeks later.

thatch at the top and turning it to one side. Be sure the stems are completely covered. Although this method requires no earthing-up, it is quite tedious to get the straw in the correct position.

If you want cardoons in winter when other vegetables are scarce, you can leave the plants to grow, covered with a mulch of old hay or straw at night if the weather becomes frosty. Then dig up the plants, with as much soil as possible adhering to the roots, tie up the leaves for blanching and move them to a shed, cellar or other storage room. If this room is not completely dark, wrap the leaves with black polyethylene or brown paper as before and heap soil, sand or peat over the roots to keep them moist. The cardoons should remain in good condition for several weeks, and you will have blanched stems for cooking when you want them.

To cook the cardoon stems, tie them together in bunches and boil them like asparagus, serving them with a cheese sauce. They can also be eaten raw with savory dips. If your plants produce flowering stems when immature, the flower buds, which are usually cut in autumn, can be cooked whole, like globe artichokes, to which they are somewhat similar in flavor.

Carrots



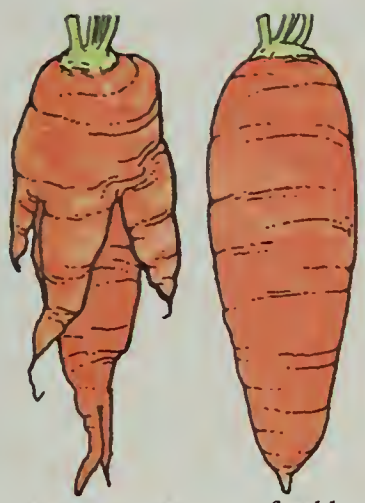
Daucus carota (fam. *Umbelliferae*)
Herbaceous biennial, grown as an **annual**
Sowing to harvesting time: early crops are ready for pulling after about 6–7 weeks, maincrops after 8–10 weeks
Size: up to 9 × 2 in (22.5 × 5 cm) for long-rooted varieties; up to 5 × 2½ in (12.5 × 6.3 cm) for stump-rooted types
Yield: 25 lb (11.5 kg) per 30 ft (9 m) row for maincrops, slightly less for early crops

Carrots are one of the easiest vegetable crops to grow, provided the soil has been well prepared. They are rich in calcium, phosphorus and vitamin A, and are a very popular winter standby, when other vegetables are scarce or expensive to buy.

Carrots can be classified in two different ways: by shape or by the time of cropping. Shapes can be basically divided into three different groups, the short kind, which are round or stump-rooted (sometimes called shorthorn varieties), ideal for early or forced crops; the medium length type, more or less sausage-shaped or with a cylindrical tapering root, suitable for both storage and immediate use, and the long rooted, tapering type, which make a good, late maturing crop and are particularly suitable for exhibition. A good rule of thumb is: the more difficult the growing conditions, the smaller and quicker growing the varieties cultivated should be.

Carrots, like beets, are basically cropped in two ways. Early, quick-growing crops are pulled when quite small and either used raw in salads or cooked. These can be grown under glass or in the open. Their taste and texture when young are considered by many to be superior to fully mature carrot crops; they are sweeter and more tender than maincrops. The larger carrots, sown later in the year and pulled for winter storage, tend to be slightly tougher in texture and less flavorful. Recent developments in plant breeding, however, have resulted in vastly improved maincrop varieties, without the pale, stringy, central core which made them so unpopular in the kitchen. These new varieties are also tastier.

Carrots are herbaceous biennials grown as annuals. Most people think of all carrots as orange, but the wild carrot from which garden types were developed has a white taproot, and in Europe purple, white and pale yellow varieties of carrots are grown. Because of their high sugar content, carrots are cultivated abroad for sugar production as well as for use as a vegetable, and for distilling alcohol.



Carrots grown on stony or freshly manured soils may become forked (left), rather than straight.

Suitable site and soil

Carrots prefer a deep, light, sandy loam. Early crops grow best in full sun, while maincrops appreciate some shading from hot summer sun. Soil conditions are extremely important, because carrots are a root crop, and must penetrate and build up their structure within the soil. Carrots require a deeply dug bed of friable (crumbly) soil about 18 in (45 cm) deep, rich in finely divided particles of humus. Gravelly, heavy clay or stony soil is not suitable, because the roots will be unable to penetrate the soil evenly. Very light, sandy soils are only good for small early carrots; maincrop varieties require more substantial soil. Ideally, carrots should be grown on land with a high water table, so the crop never suffers from drought. This does not mean, however, that waterlogged or badly-drained soil is suitable, as carrots will not do well in those conditions.

Carrots should be grown on soil which was manured for a previous crop. If manure, garden compost or similar materials are introduced into the soil immediately before growing carrots, some of the crop will tend to be malformed, the roots being split into two or more forks. Large stones can also result in crooked, deformed roots.

On a plot where crops are being grown in a rotation system, carrots should ideally be grown in the previous year's celery bed, or follow lettuce or peas.

Soil preparation

Carrots grow best in sandy loams, but less suitable soils can be adapted for growing carrots by thorough digging and the incorporation of humus-forming manure or garden compost well before the seeds are sown. Ideally, carrots should follow a crop for which the ground was previously manured but, if possible, major soil preparation can take place early in the autumn before sowing, the soil being left rough over the winter. If the soil is very sandy, leafmold or compost will enrich it and increase its moisture retention. Make sure the organic matter is broken up and thoroughly mixed with the soil, so there are no pockets of compost or leafmold. Sandy soils are further improved by the addition of peat; peat helps to bind loose, fast-draining soils and also encourages better drainage and crumb structure on heavy soils that need lightening.

A week to ten days before sowing, rake the bed level and create a fine tilth to be certain of maximum germination. After raking, work in 2 oz per sq yd (60 g per sq m) of a general fertilizer which has a low nitrogen content. Rake the fertilizer well into the surface of the bed.

When you have raked the bed level, position a line of string between two stakes across the bed to mark out the row of carrots. Run a corner of a hoe or rake along the line to cut out a V-shaped furrow at least ½ in (1.3 cm) deep. Make the rows 6–9 in (15–23 cm) apart for early crops, and 1 ft (30 cm) apart for maincrops.

Sowing

Maincrops are sown from midspring to the end of midsummer, the later the better, to avoid attacks from carrot fly. Early crops are sown outdoors from the beginning of spring, and at two-week or monthly intervals until late summer, to have a continuous supply. There are

Step-by-step Growing Guide for Carrots 191

SOWING

1. At least a week before sowing, apply a complete fertilizer to the site.

2. Take out narrow drills about ½ in (1.3 cm) deep, and 6–9 in (15–23 cm) apart.

3. Sow the seeds in the drill as thinly as possible to avoid overcrowding and lessen thinning later.

4. Cover the seed and firm the soil, and then level the surface by pulling a rake lightly over the rows.

about 18,000 seeds per 1 oz (30 g), and the seeds will remain viable for five years if properly stored. Pelleted seeds are available and, although more expensive to buy, they are easier to handle and cut down the amount of thinning required.

Carrots prefer warm soil and grow best when not checked by cold. Seeds may fail to germinate if sown during a prolonged cold spell. If the weather is bleak at the time you planned to sow, use plastic mini-tunnels to warm up the soil in advance and to protect the seedlings. Make sure the end flaps of the tunnels are closed, or conditions will be very windy inside them, and their whole purpose will have been defeated.

There are several methods of sowing carrot seeds. They should be sown as thinly as possible, to avoid waste and the task of thinning out. Pelleted seeds can be placed singly in the drills, 1 in (2.5 cm) apart. A traditional method is to mix the seeds with sand, and then sow the mixture evenly along the drill. You can also mix radish seed with the carrot seed. The radishes will be ready for harvesting early and this is an easy way of thinning the carrot row. Alternatively, you can sow carrot seed either in pinches between finger and thumb, or by carefully shaking the seed into the drill direct from the packet with the hand held just a little above the drill. Whatever method

of sowing is used, the drill should have been thoroughly watered the day before sowing, if the soil is at all dry.

After sowing, replace the soil by gently covering the drill, so that the seeds are no more than ¼ in (7 mm) deep, using the back of a rake. A better but more painstaking method of doing this job is to place your feet on either side of the drill, and shuffle forward along the row, with your toes pointing outwards and your feet pushing soil into the drill. This action safely covers the carrot seed and at the same time gives the row a gentle firming. After covering the seed, rake the soil level by lightly pulling the rake down the row—never across it. Raking across the row would disturb or actually displace some of the seeds. Germination normally occurs from 14–18 days after sowing, but may be a few days longer in cold conditions. If a heavy rain threatens immediately after sowing, cover the drills with mats so the rain does not beat down the soil. This also keeps the seeds from getting too much water and possibly rotting.

Thinning and general cultivation

The essential task of thinning should begin when the tops are about 1 in (2.5 cm) high. The best time to thin your carrots is after a shower; the water loosens the soil and makes the seedlings easier to lift. Doing this work in the evening seems to lessen the chance of attack from carrot fly.

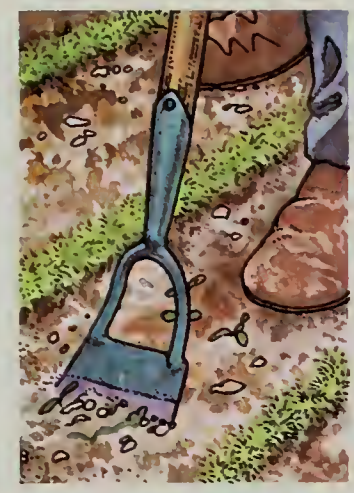
If the carrots were sown in groups, pull out the smallest seedlings in each cluster; if sown continuously along the drill, thin initially to ½ in (1.3 cm) apart. The carrots from the first one or two thinnings will be tiny, but the last thinnings in the early crop can be used in the kitchen. Early crops should have a final distance of 2 in (5 cm) between each root; the maincrops should be thinned to a final distance of 4–6 in (10–15 cm) apart.

Try not to bruise or break the leaves while thinning, as the pungent odor is very attractive to carrot flies. For the same reason, remove all thinnings immediately and bury them well in the middle of the compost heap. Because firm soil

Marshall Cavendish/Clay Perry

▲ *Young carrot seedlings just after thinning; try not to damage the leaves while thinning.*

CULTIVATION



1. Hoe regularly between the rows of seedlings to remove weeds.

2. When the seedlings are 1 in (2.5 cm) high, thin to a spacing of ½ in (1.3 cm) apart. Water the soil before thinning.

3. Firm in the remaining plants and water the ground to deter the carrot fly, which is attracted by the carrot smell.

4. Sprinkle a complete fertilizer between the plants in the rows, and water the ground again.

discourages the female fly from laying eggs, water the rows after thinning to firm the soil and fill any holes created by the removal of seedlings. If the soil is cracking because of dry weather, it needs water. Keep weeds under control, and do not allow the crop to run short of water during dry spells.

Frame cultivation

Forcing varieties of carrots can be grown to mature at times when bought carrots are expensive. Sow the seed on a hotbed in a cold frame in midwinter if the weather is mild, otherwise wait until the weather warms up in late winter or early spring.

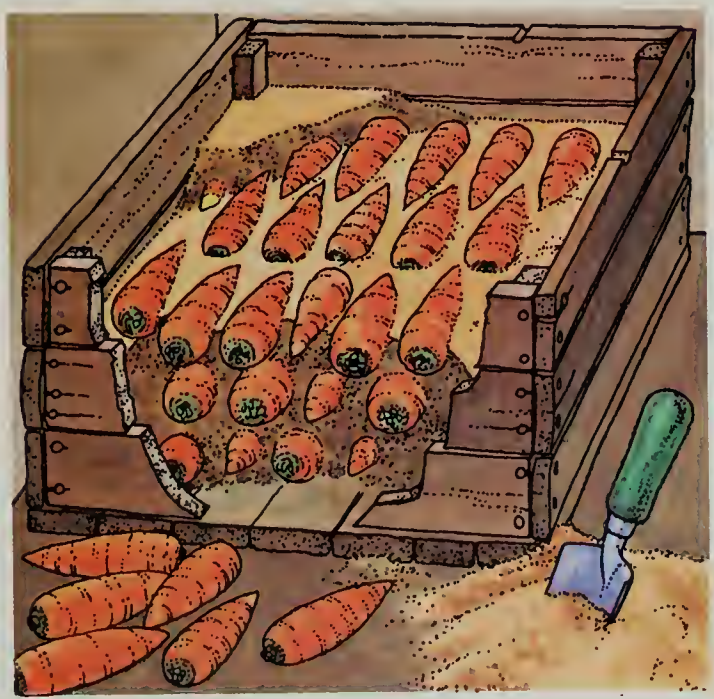
Scatter seeds of a stump-rooted carrot variety thinly over the soil, work them in just below the surface with a hand fork, and firm the bed with a wooden board. Water frequently, give ventilation if the weather allows, and cover the frame with sacking or other protection on frosty nights. Do not allow the temperature to fall below 45°F (7°C). At first, thin to about 1 in (2.5 cm) apart, then to 2 in (5 cm); these second thinnings should be big enough to use in the kitchen. When grown in a cold frame, carrots can be sown with lettuce or radishes (since they sprout earlier than carrots); these can be harvested fairly quickly, giving the long term carrot crop room to grow.

HARVESTING

1. Water the ground the night before harvesting so that the young carrots can be easily pulled by hand.

2. To lift mature carrots in autumn, a fork is necessary.

3. Before storing, use a sharp knife to cut off the tops close to the neck.



4. Autumn crops can be stored for winter use. Pack them evenly between layers of dry sand in a large wooden box, and keep the box in a frostproof shed.

Brian Furner

▲ *The fernlike foliage of carrots; the roots are ready when the leaves begin to curl and die.*

Carrots can also be forced in unheated cold frames out of doors, from late winter onward. Cultivation is the same as for carrots grown on a hotbed. Without the additional warmth of a hotbed, though, the carrots will take longer to mature.

Harvesting and storing

Once they have reached the desired size, short-rooted early varieties can be harvested and harvesting can continue for several weeks. These carrots are at their best and most tender when still quite small, between 1–2 in (2.5–5 cm) long. Earlier thinnings can also be used, although because of their small size they are a bit awkward to deal with in the kitchen. If the ground is dry, water thoroughly the night before pulling, so the carrots come out of the soil without being damaged.

Although carrots are reasonably frost-hardy, it is a good idea to lift maincrop carrots by the end of midautumn. If you live in a mild area, you can leave them in the ground well into winter, but cover the crop with hay, leaves or clean dry straw whenever heavy frost threatens.

When carrots are fully mature and ready for lifting, the outer leaves begin to wilt and the remaining foliage curls up. This is an indication that they have stopped growing, and there is no point in leaving them in the ground any longer.

Choose a dry day at the end of the season to lift the crop. Use a garden fork

to loosen the carrots from the soil, and then pull them out by the foliage. After lifting, cut off the foliage near the crown and put it on the compost heap. Remove all the soil adhering to the roots and examine the carrots carefully before storing. Any which have been accidentally speared by the fork during the lifting operation should be set aside to be eaten at once, as damaged carrots quickly rot.

Carrots can be stored outdoors in a hole filled with dry sand and covered with straw, or in a clamp or mound like potatoes. If properly constucted, the carrots can be kept in the clamp through winter and well into spring. These storage methods are most useful if you have a very large crop; for moderate or small-sized harvests, it is more convenient to store them indoors in a box in a cool frost-proof shed or cellar. To do this, fill a box with a 2 in (5 cm) layer of sand, and then place a layer of carrots head to tail on the sand, followed by alternating layers of sand and carrots. The final layer should be sand, and the carrots can be easily removed from the box as needed.

Carrots stored in a clamp will keep firm and fresh for several months; carrots stored in boxes will keep for a slightly shorter period of time.

Preserving by canning

A good way to enjoy carrots from your garden all year round is to preserve a batch of them by canning. Carrots can be packed—raw or preheated and packed hot—in glass jars or tin cans. Raw carrots should be packed tightly into whichever type of container you choose because they shrink during processing, but heated carrots need to be packed fairly loosely. The water added should be enough to cover the food; uncovered food tends to darken.

The glass jars you use should be in perfect condition—do not use any with cracks or chips as defects prevent the necessary airtight seal. Cans must also be in good condition, with no dents, rust, or damaged lids. You will also need a

MAKING A CLAMP

1. Choose undamaged carrots, and pile them on dry ground in a conical heap, thin ends pointing inward.

2. Cover over the carrots with a layer of clean, dry straw at least 6 in (15 cm) thick all around.

3. Cover over the straw with a 6 in (15 cm) layer of soil. Leave a ventilation hole at the top.

steam-pressure canner to process the carrots after they have been sealed in cans or jars.

For best results, carrots for preserving should be young, tender, as fresh as possible and unblemished. Carefully wash the carrots, scrape them and then slice or dice for canning.

Freezing tips

If you prefer, some of your carrot crop may be stored in your freezer. Remember, the fresher they are when frozen the better tasting they will be when defrosted and eaten later.

Wash and scrape the carrots. While small carrots may be left whole, larger ones should be cut into ¼ in (6 mm) cubes, thin slices or lengthwise strips. In boiling water, heat small whole carrots for five minutes and those diced, sliced or in lengthwise strips for two minutes. Then place the blanched carrots in cold water immediately to cool and stop the cooking process; drain well. Foods are packed cold to speed the freezing process and thus to help prevent any loss of flavor, color or texture.

Heating vegetables before packing for freezing is done to slow or stop the action of enzymes during frozen storage in order to maintain better quality. Unchecked enzyme activity while frozen could cause the carrots to become discolored or toughened or to lose their true flavor. Heating also softens vegetables, which makes it easier to pack them in containers.

Pack the cooled carrots into containers making sure to leave ½ in (1.3 cm) head space for expansion when frozen; seal and label containers and place in your freezer at 0°F (17.77°C).

For a nominal charge, you can obtain more specific instructions about home canning and freezing by writing for booklets to the U.S. Department of Agriculture, Washington, D.C. 20250. Specify the type of food you plan to preserve by canning or freezing and be sure to include your complete address and zip code.

Exhibition tips

The type of carrot you exhibit depends to a large extent on the show date. For early shows, in mid to late spring, select quick-maturing varieties. These do best when sown in a hotbed or a cold frame in midwinter. An electric heating cable will provide the heat necessary to get the carrots growing.

For early or midsummer shows, you can sow one of the larger varieties of carrots in early or late spring. If the weather is not unseasonably cold, a hotbed will not be necessary, although cold frame protection is still beneficial. Make sure the soil is absolutely first class, sandy loam; otherwise, prepare boreholes with a crowbar 18 in (45 cm) deep and 1 ft (30 cm) apart in all directions. These boreholes should be filled with sifted old hotbed soil or fine topsoil mixed with sand. You can also show short quick-growing carrots at midsummer exhibitions.

As long as you have thinned them to 4 in (10 cm) apart in the early stages of growth, you should be able to select good specimens from your garden without any additional work being needed.

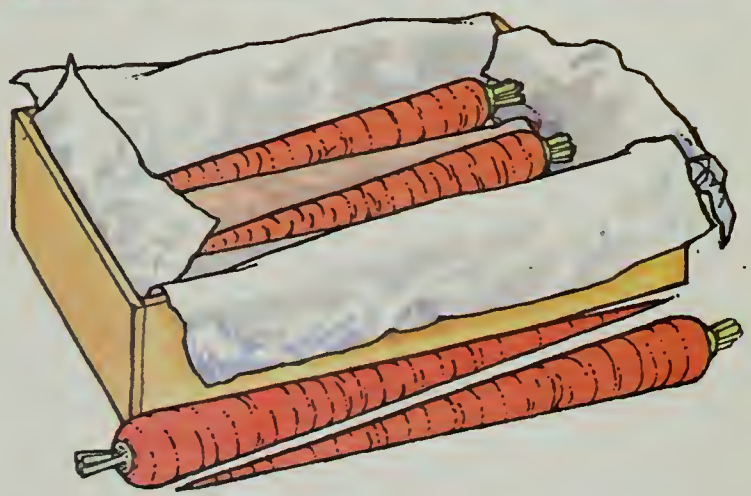
For late summer shows, sow in midspring and again in late spring, in the open ground. If your soil is badly drained, and you are still determined to produce prize-winning carrots, grow them above ground in large clay drainpipes filled with good sandy loam. Barrels are also suitable. Remember, though, that containerized soil dries out much more quickly than ground soil. The water supply must be consistent; if the soil dries out and then is thoroughly drenched, the roots will split.

Carrots grown for late shows benefit from a bit of shade, perhaps given by neighboring plants; shaded soil tends to conserve moisture. Carrots, particularly those grown in boreholes, sometimes grow up out of the ground, and the exposed shoulders then turn green or become otherwise disfigured. As soon as you see them beginning to push out of the ground, gently draw soil up around the carrots to cover them, and repeat as

EXHIBITING

1. To grow long carrots for show, use a crowbar to make holes 18 in (45 cm) deep for sowing.

2. Harvest the carrots carefully by digging a trench alongside the row. Lift the roots gently.



3. Pack long carrots for transporting to the show by placing them tightly, head to toe, in a tissue paper-lined box. The carrots must be dry, and the tops cut back to 1 in (2.5 cm).

necessary. Leave the carrots in the ground until as near as possible to the show date. The one exception is if prolonged rain threatens. To avoid having the carrots split from excess water, lift and store them in moist sand until the show.

Although you can pull carrots out of the ground by their leaves, the skin may be marred in the process. Dark vertical scratches may appear from the friction between the carrot and soil particles. If the ground is soft, it may be all right to pull out the quick-growing, small varieties, but the intermediate and long varieties should be dug out with a spade. Dig carefully until you have completely exposed one side of the carrot, from the surface of the soil down to the tip of the root, and gently lever it out.

Have plenty of wet sacking nearby to wrap around the newly dug carrots; they should never be allowed to dry out. Wash them fairly quickly at this stage with cold water and a sponge; carrots which have split or otherwise damaged roots will then be exposed and can be discarded for show use, although they will probably be perfectly all right for cooking. At this stage reject any carrots which are pale or weak in color and those which have green or otherwise dis-

figured shoulders. Asymmetrical or bulgy carrots should also be rejected for the show. After this preliminary selection has been made, cut off the fine, fibrous roots as close as possible to the main roots with a sharp knife.

If you are packing the carrots to take to the show, remember that much damage can be done if the roots are packed too loosely and can roll against each other in the packing box. Give the carrots a final wash, again with water and a sponge. Never scrub the carrots or you will damage the skin, and never oil them. They should be packed dry, each carrot wrapped in tissue paper, with the foliage cut back to 1 in (2.5 cm) from the carrot top. Then wedge the roots tightly into the box, the widest part of one carrot adjacent to the narrow root of the next.

Although it may vary from show to show, the carrots are usually divided into two categories: long pointed varieties, and all other types. Six is the usual number required for single displays, and ten for collections of vegetables. Carrots look best when displayed in pyramids on a plate and garnished with parsley. To keep the carrots fresh until judging, spray them with a fine mist of water. The judges will look for well-shaped carrots, as uniform as possible, with clear, bright color. The texture should be firm and the flesh tender and juicy.

Brian Furner

▲ *Baby-finger Nantes*

Varieties

Baby-finger Nantes: a new miniature Nantes type; excellent for canning or pickling whole. Harvest early. Tops weak, do not pull.

Canuck: from Canada, especially suited to North and muck soils. Very long rooted.

Danvers Half Long: old but still popular; roots broad, tapered, slightly stumped. Strong-topped, heavy producer.

Brian Furner

▲ *Parisian Rondo, popular abroad.*

Brian Furner

▲ *Super Nantes*

Brian Furner

▲ *Red Cored Chantenay*

Brian Furner

▲ *Danvers Half Long*

Gold Pak: very uniform, long and slender. Outside smooth, good color inside. Popular market sort.

Imperator Special: long, slightly earlier than Gold Pak with broader shoulder, more taper. Good color in and out.

Long Marketer: Imperator type, bright orange in and out; strong top. High yielder; resists greening at shoulder.

Red Cored Chantenay: medium length, thick-shouldered; tapered and stump-rooted. Core color like flesh.

Short 'n Sweet: rich and sweet flavor; like shorter Red-Cored Chantenay. Good in shallow and heavy soils.

Super Nantes: a long Nantes, cylindrical and smooth. Blunt ended and small cored.

Sweetheart: medium length; slender, cylindrical with blunt ends. Tender, brittle, very sweet.

Tendersweet: one of sweetest carrots but later than most. Long, coreless; deep orange and tapering to point.

Brian Furner

▲ *Canuck*

Brian Furner

▲ *Spartan Bonus*

Brian Furner

▲ *Long Marketer*

Spartan Bonus: long, very uniform, quite tapered. Deep orange in and out. Popular for processing, slicing, dice-canning.

Varieties grown abroad

Amsterdam Forcing: very popular stump-rooted carrot, earliest to mature; excellent for successional sowings.

Parisian Rondo: almost completely round roots 2 in (5 cm) in diameter when fully grown.

Little Finger: slender, quick-growing carrot of good flavor.

Sucram: high sugar content and very sweet flavor; very small, tapered.

Autumn King-Early Giant: long, blunt-tipped, extra hardy; good for storing for winter use.

Scarlet Perfection: long, stump-rooted variety; first-class flesh; keeps well for winter use.

St. Valery: good cropper; long tapering roots suitable for exhibitions.

Juwarot: cylindrical-shaped carrot; very good flavor and high vitamin A content; attractive bright orange-red color.

Pests & Diseases

Carrots are largely pest- and disease-free; most of the problems occur when carrots are improperly stored in autumn and winter. Conscientious storage preparation is the best precaution against most of the diseases listed below. If there is an outbreak, remove and destroy infected carrots immediately to avoid spreading the disease.

Carrot fly: this pest attacks other vegetables besides carrots; parsnips and celery are also vulnerable. The worst damage is most likely to occur in hot, dry weather on very free-draining soil. Large crops of carrots, such as those grown on a commercial scale, seem somewhat more susceptible than the average crop in a private garden. The carrot fly, which is about ½ in (1.3 cm) long, black with yellow legs and transparent wings, is attracted by the pungent smell of the carrot foliage, and finds small areas of disturbed soil near the rows ideal places to lay its eggs. The tiny pale yellow maggots that emerge from the eggs then burrow into the roots and may devastate the crop. Wilting, reddened foliage is usually the chief symptom above ground; seedlings may be killed.

Royal Horticultural Society Garden, Wisley

▲ *Damage to the roots caused by carrot fly maggots; spring sowings suffer most.*

The main carrot fly attack occurs in late spring, so by delaying sowing until early summer it is possible to miss it altogether. The second generation of adult flies does not start laying eggs until late summer, and the maggots hatching from these are unlikely to cause serious damage.

Since thinning the young plants unavoidable releases the smell of the foliage, sow the seeds as thinly as possible to reduce the possibility of attack. Do this in the evening, when the fly is less likely to be about, and destroy the thinnings. Never use a hoe to thin out the young crops; disturbing the soil encourages the flies to lay eggs nearby.

Some veteran gardeners sow rows of parsley between the carrots, because the scent of parsley is said to counteract that of the carrot leaves and so distract or deter the fly. Rows of onions between carrot rows are said to have the same beneficial effect. Alternatively, a rag soaked in kerosene can be pulled along the rows occasionally to introduce a camouflage scent.

Wireworm: this pest is serious in gardens which have been newly turned over from grassland, and is unlikely to cause any trouble on land which has been under cultivation for some time. The larvae of the click beetle are also damaging on weedy, neglected gardens. The larvae, which are about 1 in (2.5 cm) long, shiny and yellow with six legs, live in the soil and eat the roots of many plants besides carrots, severely damaging or killing them.

The best precaution against wireworm is to make sure your ground is cultivated well and often. Hand weed between plants to keep weeds down, and also expose wireworms to insectivorous birds. Seeds treated with insecticide are somewhat less vulnerable. If the soil is badly infested, you can apply approved insecticides according to manufacturer's instructions.

Aphids: these weaken the carrots by sucking sap from the foliage, and some forms damage the roots, so are doubly damaging. The foliage of carrots will be stunted, wilted, and grayish-green. To control aphids, apply nonpoisonous materials such as rotenone as soon as the infestation occurs, and again as necessary. Since they attack during dry weather, keeping the plants well watered will help to ward off and minimize the damage. Also keep down weeds in your garden; they may shelter aphids and be sources of infestation.

Eelworm: there are various sorts of eelworm which attack both herbaceous and vegetable crops. The microscopic, transparent worms live inside the root tissue of the carrot and multiply rapidly, sometimes killing the host plant. Eelworms are difficult for the home gardener to control with chemical insecticides as the soil remains infested for some time after the host plant is removed. Once the carrots are infested, the symptoms of which are wilted foliage and distorted roots, all carrots must be dug out and destroyed immediately. You cannot use the ground for growing carrots for at least seven years and all weeds should be destroyed. In recent years, marigolds planted among carrots or other crops have been successful in eliminating or reducing eelworm attacks.

Ministry of Agriculture, Fisheries & Food

▲ *Carrots with the characteristic symptoms of a fungal disease.*

GUIDE TO CARROT TROUBLES

Symptoms	*Probable cause*
Wilted, reddish foliage; seedlings killed; irregular holes in roots	Carrot fly
Wilted leaves, round holes in roots	Wireworm
Wilted, stunted foliage, distorted roots	Eelworm
Wilted, gray-green foliage, white particles present	Aphids
Roots split, often exposing core	Split root
White woolly fungal growths with black spots	Sclerotina rot
Soft, grayish, smelly flesh	Soft rot
Black patches on shoulders of roots	Black rot

Split root: this is a physiological disorder, rather than a disease, which is usually caused by a fluctuating water supply. If there is a heavy rainfall after a period of drought, the inner flesh of the carrot expands faster than the toughened skin, causing the skin to fissure. The best precaution against split root is to be sure that the carrots are never allowed to go for long periods of time without water.

Sclerotina rot: this is a problem which occurs under improper damp storage conditions. The symptoms of sclerotina rot are white woolly fungal growths, first seen near the crowns of the roots; in these growths form black resting spore-bodies which can later infect nearby carrots. The best precaution is to make certain that there is proper ventilation in the clamp or box, and that no damaged carrots are ever stored. If there is an attack of sclerotina rot, remove and destroy all infected carrots.

Ministry of Agriculture, Fisheries & Food

▲ *White, woolly fungal growths caused by a severe infection of sclerotina rot.*

Soft rot: this is a bacterial disease most often encountered in roots damaged during cultivation or by pests; infected carrots become soft, discolored and unpleasant smelling in the center, although the outside may look normal. As with sclerotina rot, remove and destroy infected roots so that the bacteria cannot infect healthy carrots. Heavily manured soil, in which carrots are grown in successive years, predisposes them to the disease.

Black rot: a disease found on stored roots, which shows as black sunken patches, usually near the shoulder of the root. As the fungus is carried on the seed, it should always be obtained from reputable seedsmen. Affected roots should be destroyed, not put on the compost heap, or returned to the soil.

Violet root rot: a serious fungal disease in certain countries abroad. It attacks asparagus, parsnips, beets and potatoes as well as carrots. It is a soil-borne disease and infected carrot plants have webs of reddish-violet strands enmeshing the roots and yellowing of the leaves.

step-by-step growing guide

Cauliflowers

Brassica oleracea botrytis (fam. *Cruciferae*
Biennial, usually grown as **half-hardy annual**
Sowing to harvesting time: 10–16 weeks
Size: head 4–15 in (10–37.5 cm) across; stalks 3–6 in (7.5–15 cm) long; leaves 18–24 in (45–60 cm) high
Yield: 1–2 lb (0.5–1.0 kg) per plant; 5–7 plants per 10 ft (3 m) row

Cauliflower is the most luxurious of the brassicas, and the one requiring most care. While other brassicas, such as kale, cabbage and Brussels sprouts, are regarded as reliable standbys, able to cope with the worst winter weather, growing cauliflower is regarded as something of a challenge. It is a very popular vegetable, though, because of its delicate taste and pleasing appearance, and is well worth the extra effort involved. For exhibition work, it can be the focal point of a mixed vegetable display.

In the kitchen, cauliflower is the most versatile of the cabbage family. Its tightly closed, creamy white flower buds, or curds, can be eaten raw with a salad dressing, boiled and served on their own or as an accompaniment to a main course, or preserved in various pickles. When cooking, cauliflower does not fill the kitchen with that unpleasant cabbage smell, and it is eminently suitable for freezing.

Some gardeners feel there should be considered two sorts of cauliflower: summer and winter. The former is a proper cauliflower, while winter cauliflower, they feel, is actually a type of broccoli. They look practically identical, however, and both sorts are sold in the market as cauliflowers. They grow on short, tough stems 3–6 in (7.5–15 cm), crowned by a cup of leaves which contains the flowering head. The leaves surrounding summer cauliflowers are loose and spreading, while those of winter cauliflowers are tightly curled around the head to protect it. The curds of winter cauliflowers are slightly coarser in texture, but there is really not much difference in taste between the summer and winter varieties.

In fact, the names "summer" and "winter" are a bit misleading. Some summer cauliflowers are planted in late winter under glass, for harvesting in late spring or early summer. Maincrop varieties of summer cauliflower are sown outdoors in spring for harvesting in summer and autumn. It is unlikely, however, that many gardeners can harvest cauliflower in the heat of summer, because of its dislike for hot, dry conditions. Summer cauliflowers are very particular about soil and moisture requirements, and extremely sensitive to lack of nutrients.

The so-called winter cauliflower is

A-Z Collection

With successional sowings, cauliflowers can provide a long harvest.

easier to grow, but it is much slower growing. It takes up space in your garden for a longer period than summer cauliflower; remember this when working out your crop planting plan. Although hardier than summer cauliflower, it will not survive very cold weather. Unless you live in a mild area, do not expect to harvest any cauliflower in the depth of winter.

There are dwarf growing varieties available, such as Early Snowball, which are suitable for small gardens. Recently developed strains, bred for hardiness, are also available to the amateur grower, and well worth trying.

Suitable site and soil

All cauliflowers need a neutral or nearly neutral soil to do well. If the soil is too acid, the plants will be unable to obtain molybdenum, a trace element, and may develop whiptail. However, soils which are too limey may lead to a boron deficiency; stunted, discolored and useless curds result. The best and safest method of dealing with soil acidity is to take a soil test and correct the soil, if necessary, so that the pH is between 6.8–7.0. As with all brassicas, avoid using a plot on which a brassica crop was grown within the past two years. Cauliflowers are even more susceptible than most other brassicas to the pests and diseases encouraged by continuous cropping.

Because summer and winter cauliflowers are grown under different conditions, cultivation needs differ.

The regular cauliflower is grown quickly and requires an enormous sup-

ply of nutrients to make this rapid growth; the soil should be as rich as possible. Work on the permanent bed should be done in autumn, so the soil has time to settle and consolidate before spring planting. Dig the soil to a sufficient depth to take a good layer of rotted farmyard manure or garden compost. The lighter the soil, the more organic matter it needs. It is a waste of time, however, to try to grow summer cauliflower on dry, gravelly or waterlogged clay soil. A week before planting, apply a complete fertilizer at the rate of 4 oz per sq yd (120 g per sq m).

The best site for planting cauliflower varies according to the time of year. Early crops should have a site in full sun and one which is sheltered from winds. It must not be in a frost pocket or low-lying ground. It must also be well away from any overhanging trees or tall hedges, or the plants will be poor.

The so-called "winter cauliflowers" are much more tolerant of soil conditions, and will grow on most types of soil, as long as there is no waterlogging. Because they grow slowly over a longer period, and have to face colder conditions, the one thing you want to avoid is lush, rapid, and therefore vulnerable growth. The site should have been prepared for a previous crop, such as potatoes, beans or spinach. If plenty of manure has been dug in, there is no need for additional fertilizer prior to planting. If you are applying fertilizers, avoid using those high in nitrates. The plants need a sheltered, rather than exposed, site, and one with some protection from north and east winds. They do better in sun than in shade.

Sowing

The small round cauliflower seeds, particularly those of early varieties, tend to be somewhat expensive, but there are several ways to overcome the initial expense, and still have a good succession. Either buy one packet of the variety All the Year Round, and sow in succession, or organize a group of friends and neighbors so that each one buys a variety harvested at a different date. Then divide up the seeds so that each person has a few seeds of all the varieties. The seeds are large enough to handle singly, so there should be no loss in dividing them up or sowing. If properly stored, the seed will remain viable for at least three years, so you can save any extra; ¼ oz (8 g) will yield about 500 seeds. Do not buy inexpensive seeds; they are more than likely to be inferior strains, and the whole exercise will then be a waste of time, garden space and money.

The earliest cauliflowers, which are intended to be harvested in late spring and early summer, are dwarf varieties, only 1 ft (30 cm) or so high. They should be sown under glass in February or early March and will require a constant temperature of 50–60°F (10–16°C) while germinating, but while growing a lower temperature of 45–50°F (7–10°C). They produce a minimum of small, light green leaves which give little protection to the curd; the heads are pure white and delicately flavored.

Group two is made up of the second earlies, for harvesting in summer. They are also small, but not as dwarf as those in the first group; the leaves are rather larger and darker. A sowing may be made outdoors in early spring, although this should be protected by covers against night frosts and chilly daytime weather. The plants come to maturity a little later than those sown and germinated under glass.

The third group contains the main crops; these are larger and hardier varieties of cauliflower, for harvesting from late summer to midautumn. Sow in an outdoor seedbed in mid-to-late spring. Sow in drills ½ in (1.3 cm) deep in rows 9–12 in (23–30 cm) apart.

The fourth group consists of dwarf, comparatively hardy varieties. Sown at the same time and in the same manner as those in group three, they come to maturity rather later and will tolerate a moderate amount of autumn frost. They have compact, high quality, uniform curds, protected by tightly in-curling leaves.

A seed starting mixture is the best medium for sowing under glass. Germination should take place within one or two weeks. Thinning should take place as soon as the seedlings are large enough to handle; they should be at the two-leaf stage.

If you live in a very mild area, you can sow winter cauliflower in late spring, for planting out in early summer and harvesting the following winter or early spring.

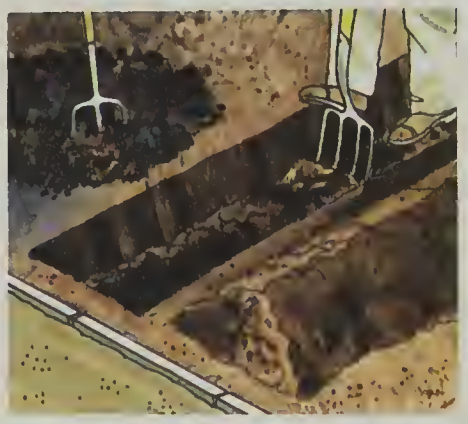
Planting out

Transplant to the prepared outdoor bed when the plants have about five leaves and protect them if frost is likely. The young plants, if allowed to grow too big and lush before transplanting, will be unlikely to form good heads. Reject any plants which are "blind," that is, those which have no visible growing point; they will never develop any further. Also do not plant any that have a markedly blue tinge compared with the other plants—these will not develop good hearts.

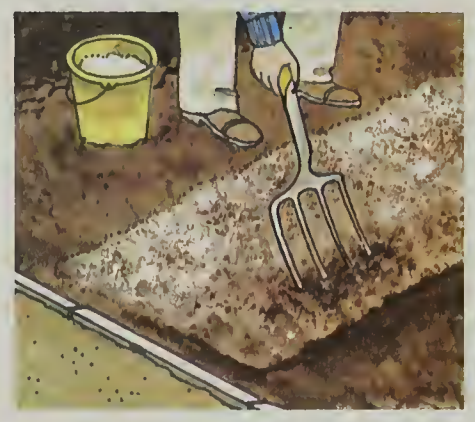
Take great care to avoid any check to the plant when transplanting, as this is one of the main reasons for small or nonexistent heads. Do not plant the roots too deeply. In times of drought, water both the plants and the prepared bed before transplanting. Keep a ball of soil around the roots during the transplanting, and lift only half a dozen or so plants at one time, to avoid dried out roots. Use a trowel rather than a dibber. In warm, sunny weather, fill each individual hole in the soil with water, insert the plant roots, and firm the soil around them. This "puddling in" makes sure that the roots come well into contact with moist soil, and the plants can establish without any check.

For crops in groups one, two and four, plant 1½ ft (45 cm) apart in rows 2–3 ft (60–90 cm) apart. For crops in group three, allow 2 ft (60 cm) between the plants. Protect each seedling against cutworms with a collar of pliable cardboard or you can use a paper cup with the bottom removed.

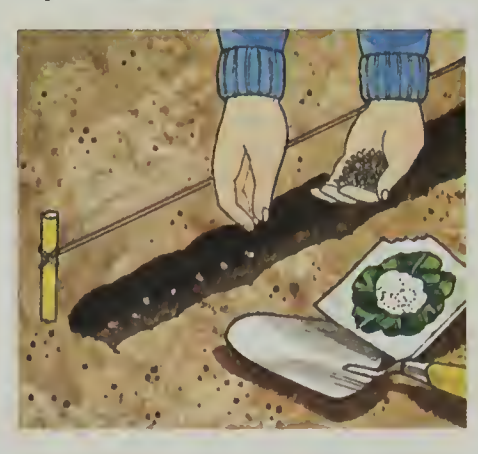
PREPARATION AND PLANTING



1. For early cauliflower, dig in well-rotted manure in autumn.



2. Test the soil pH; if it is too acid, add lime so pH is between 6.8–7.0.



3. Sow seeds individually in drills; space seeds 1½ in (3.8 cm) apart.

SELECTING AND TRANSPLANTING SEEDLINGS

Reject seedling with bluish tint; they will produce small curds.

Avoid six or more leaves; they have grown old too quickly.

'Blind' seedlings with no growing point will not form curds.

A healthy seedling: short straight stem, good leaves and plenty of root.

1. When lifting seedlings, keep as much soil as possible around the roots.

2. As a precaution against club-root, dip root balls into a fungicide paste.

3. In warm weather, fill hole with water before inserting the seedling.

4. After transplanting, firm the soil carefully around the young plant.

Care and development

The secret of success with cauliflower is rapid and continuous growth. From transplanting time onward they need copious watering; if checked at any time, they are liable to "button" or form very small heads. Even though the soil may have been very rich as a result of its preparation, it can do with even more feeding. There are several methods. One is to mulch the soil around the plants with rotted farmyard manure or garden compost three weeks after planting, drenching it with water afterwards. Another method is to work a top dressing of a nitrogenous fertilizer, such as sulfate of ammonia or nitrate of soda, into the soil around the plants with a hoe at the rate of ½–1 oz per sq yd (15–30 g per sq m) and 1 oz per sq yd (30 g per sq m) respectively, again followed by a generous watering. This should be done five weeks after planting. When the curds have just started to form, give a top dressing of nitrate of soda at the rate of 1 oz per sq yd (30 g per sq m).

Winter cauliflower sometimes has the hazard of too much water to contend with in winter, as well as that of too little during the summer. Many market gardeners earth-up around the plants in early to midautumn, forming continuous low ridges. This makes sure that excess water drains away from the stems. It also helps firm the plants against strong winter winds. If the winter has been severe, it is a good idea to give the plants nitrate of potash, at the rate of ½ oz per sq yd (15 g per sq m) in winter, so the cauliflowers can make additional growth. It is not necessary to feed winter cauliflower during the early part of its life, in summer or autumn.

Cauliflowers, particularly the early varieties, are not strongly competitive plants, and should be thoroughly weeded throughout the growing period. Be careful when hoeing not to damage the roots. Heavy mulching helps suppress weeds for a time. When young cauliflower heads start to form, draw a leaf loosely over each one to shade it from the sun and preserve its whiteness.

SUMMER CAULIFLOWER

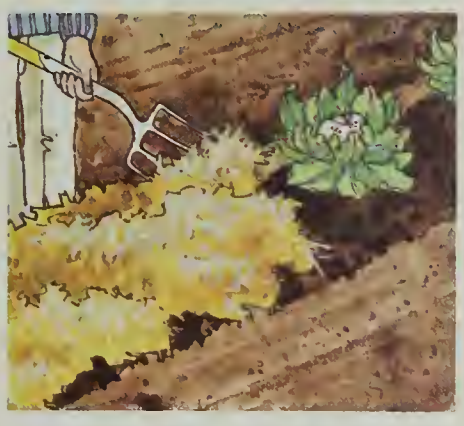
1. Water the plants in dry weather; use a fine rose on the watering can.

2. Mulch with garden compost to aid weed control and to keep soil moist.

3. Feed growing cauliflower with liquid manure or manure mulch.

WINTER CAULIFLOWER

1. Form a long low earth ridge in autumn to keep the plants wind-firm.



2. Protect heads in very cold weather by covering them with dry straw.

3. To encourage quick spring growth, apply top dressing of nitrate of potash.

Harvesting and aftercare

One advantage of choosing your seed from seed catalogues instead of buying plants locally is that you can make a selection of varieties which will extend your harvesting period so that it covers a much longer period.

Cauliflower is ready for cutting when the upper surface of the curd is fully exposed, and the inner leaves no longer cover it. Unfortunately, cauliflowers tend to mature all at once. If the weather is warm and you leave them in the ground once they are mature, the heads expand and they become discolored and less appetizing. To avoid this, and to lengthen the season, lift some of them before they are fully grown; they will be quite edible. Another way of extending the harvesting period is to hold back the heads by breaking the ribs of some of the large outer leaves and folding them over the curds. Alternatively, gather up the leaves and tie them together over the curd so that they cover it, using a piece of garden twine, a rubber band or raffia. Heads treated this way can be left up to a week. It will also protect the winter kinds from frost. To keep them for two or three weeks once they are mature, lift the whole plant, including roots. Hang them upside down in a cool shed or cellar, and syringe them daily.

Cauliflowers process well if you have a freezer. You can deal with an overabundant crop by storing the surplus for future use.

When harvesting the heads, cut in the early morning when the plant is freshest—ideally with dew on it. During frosty weather, however, it is best to wait until the warmest part of the day. Cut through the stalk with a sharp knife, leaving enough leaves around the curd to protect it.

If there is a late autumn frost which threatens to be prolonged, it is best to lift and store all plants with mature or nearly mature heads. Dig them up, with the roots, and put them on the clean floor of a cool shed or cellar. Make sure the heads are completely protected by the outer leaves, and then cover the roots

HARVESTING AND STORING

1. Fold back the inner leaves over the curd to protect it from sunlight.

2. Tie leaves in position over top of the curd with raffia or rubber band.

3. To harvest, cut horizontally with a sharp knife before curd opens.

4. To store, hang cauliflower upside-down, roots intact, in a dark place.

completely in moist sand or soil. They will keep in this way for two to three weeks.

Unlike some brassicas, the cauliflower will not produce worthwhile shoots after its head has been cut. Clear the remains of the crop as quickly as possible, either burning the surplus leaves, stems and roots, or putting them on the compost heap if they are free from pests and diseases. If you are composting them, chop up the stems and roots first. Keep in mind that you will not be planting cauliflower in the same location the following year—to avoid diseases.

Freezer storage

As has been stated, cauliflower takes well to freezing—in the event that you have a surplus that you wish to store—and freezing is one of the simplest and fastest ways to preserve food at home. Be sure to select the best of your crop for freezing—tender, firm heads that are snowy white. Break or cut each head into pieces about 1 in (2.5 cm) across and wash them well. If you suspect that they may harbor insects, soak the cauliflower in a salt-and-water solution (four teaspoons of salt for every gallon of water) for 30 minutes, then drain well.

Brian Furner

Cauliflowers yield one head per plant. After the head is cut, no edible sideshoots are produced, so clear away the plants.

In a pot large enough to hold all the cauliflower, bring to a boil water to which salt has been added—again in the proportion of four teaspoons of salt per gallon—and using at least one gallon of water per pound of vegetable. Add the vegetables and heat for three minutes—to make the cauliflower easier to pack and to halt enzyme action so that the fresh flavor, color and texture will be maintained in frozen storage.

Once heated sufficiently, the cauliflower must be cooled quickly and completely or they will continue cooking and become soggy. Do this by plunging them into a large pot of cold water. Keep the pot under cold running water or change the water as often as needed to keep it cold. When the cauliflowers are cool, pour off the water and drain the vegetables thoroughly. (Packing vegetables cold also allows them to freeze faster.)

Pack the cold cauliflower pieces into containers right up to the top—no head space is necessary. Seal your containers carefully to make them airtight and leakproof and label them as to contents and date of freezing. Then they are ready for your freezer, which should be at 0°F (−17.77°C) or lower. At this temperature, most vegetables can be expected to maintain high quality for 8–12 months.

Exhibition tips

Because of the timing of most local shows, summer cauliflowers are more often exhibited than winter ones. The best variety to grow for show purposes is All the Year Round, because it is accommodating enough to be grown for most show dates. The exact timing of sowing for a particular show is virtually impossible, due to unforeseen changes in weather. Make a small sowing and make weekly sowings for the next month; this way you will be able to select the best heads, and avoid disappointment.

Although the best cauliflowers for exhibit are those which have been picked on the day, you can pick mature heads up to a week before the show and store them. Cut the roots off and strip the outer leaves; leave about 10 in (25 cm) of stem. Hang the cauliflowers in a cool, dark shed. If the temperature drops below freezing, though, the curds will be damaged, and useless for exhibition work.

A few days before the show syringe the cauliflowers selected and fold over the leaves to protect them. Three heads is the usual number shown in single classes, and six heads in collections. On the morning of the show, make your final selection and cut the smaller inner leaves off, leaving the outer ones with the tough midribs to protect the plant. It is unlikely you will have to wash the heads, as they do not come into contact with the soil. To take them to the show, leave the outer leaves on, roughly trimmed, wrap the heads in tissue paper and put each head in a plastic bag and place close together, head to tail in a box. It is best to pack them in a single layer; fill the spaces between the heads with padding.

Keep the heads covered until the last moment before the show. If three heads are being shown, arrange them on a plate or in a round basket, with the heads pointing outward.

The judges will look for reasonably-sized heads, 5–6 in (12.5–15 cm) in diameter; they should be pure white, tightly packed with solid curds, without any staining or frothiness. Heads with brown

EXHIBITING CAULIFLOWERS

1. Wrap heads in tissue and plastic bags, then pack firmly in padding.

2. Displaying cauliflowers by spiking them onto a triangular wooden board, a method uncommon, and not always permitted.

or pink curds, usually a sign of lack of water, will not win prizes, nor will those which have irregularly shaped heads, or leaves mixed in with the curds.

In some areas, triangular mounting boards are used to display six heads. The heads are spiked onto 6 in (15 cm) wire nails which are evenly spaced over the board. Pack the spaces in between the heads with fresh moss and parsley sprigs. Make sure the parsley is neat, well back and close to the base, so that the depth of the heads can be seen. The process of setting up a triangular display may take up to two hours to do properly, so leave yourself plenty of time.

Varieties

Abuntia: one of the earliest of all; heads medium-sized, crisp, high quality.

All Year Round: large, close head surrounded by dark green leaves. Keeps in good condition a long time.

Chartreuse: head bright green, large; plants tall, spreading. Better tasting than true cauliflowers.

Dry Weather: a good all-purpose sort especially suited to the northern plains; a sure header.

Early Abundance: another extremely early sort; especially suited to muck soils. Heads large, deep, well covered; hold color.

Extra Early Snowball: excellent texture; does not discolor easily. Also good for later crop; adapted to muck and highland soils.

Igloo: excellent late variety; compact with good head coverage. A good freezer.

Royal Purple: very late, hardy; more tender and delicately flavored than true

Harry Smith

▲ *All the Year Round*

cauliflowers. A good freezer; colorful in salads.

Self Blanch: vigorous with curled leaves that self-wrap during cool weather.

Snow Crown: All-America winner; an early hybrid type. Vigorous, uniform, well-wrapped heads.

Veitch's Self Protecting: late, heads well protected by leaves. Good for late fall, early winter.

Whitehorse: early, high quality; heads deep, firm, snow white. Canadian.

Varieties grown abroad

Autumn Giant Superlative Protecting: good reliable variety; heads large, solid, white, well protected.

Forerunner: large solid heads, particularly well protected by outer leaves; very good flavor.

Alpha-polaris: largest headed of early maturing varieties; solid white heads well protected by leaves.

Early Snowball: very early, short-leaved type; compact and suitable for small garden.

Mechelse-classic: excellent forcing variety; extremely early, dwarf type; first class heads.

Snowball: produces superb white solid heads; excellent for table, exhibition and freezing.

Dominant: excellent for kitchen and exhibition work.

Rocket: maincrop with pure white heads, deep curds; keeps well in hot weather; fine flavor; heads well protected by foliage.

Manly: solid heads of pure white curds in midautumn; very reliable and uniform cropper.

Canberra: strong foliage, firm white heads.

Bondi: dwarf growing, uniform heads.

Kangeroo: excellent for table and exhibition work.

Barrier Reef: dwarf growing with deep white curds; very hardy.

Boomerang: excellent white curds.

Superb Early White: earliest variety for mild areas; pure white solid heads.

Snow White: excellent firm white heads; suitable for mild areas.

Snow's Winter White: pure white heads.

April: hard, white, solid heads; keeps for long periods.

Early March: stock specially selected for pure white curds; well protected by inner leaves.

St. George: reliable, very hardy; firm white curds; suitable for freezing.

Royal Oak: firm, solid heads well protected by inner leaves.

Walcheren Winter: handsome tasty white heads.

Newton Seale: very large crops, frost resistant.

Purple Cape: fine-flavored heads which resemble very large purple sprouting broccoli.

Summer Snow: pure white curds; very solid heads.

Adam's Early White: very hardy type; fine flavor.

Leamington: one of the hardiest types; excellent for northern areas; one of the oldest varieties still in cultivation.

Brian Furner

▲ *Self Blanch*

Harry Smith

▲ *Dry Weather*

Brian Furner

▲ *Extra Early Snowball*

Brian Furner

▲ *Snow Crown*

Brian Furner

▲ *Igloo*

Marshall Cavendish Mark Lawrence

▲ *Royal Purple*

Pests & Diseases

Cauliflower is vulnerable to the same pests and diseases as other members of the brassica family. Because many of these organisms build up in the soil over the years, it is absolutely necessary to rotate your crops. Ideally, brassicas must not be grown on the same site more than once in three years.

Cabbage maggot: these are particularly troublesome pests because frequently there may be three generations of them in a single summer; deal with the first generation early in the season, before they have time to reproduce. Maggots emerge from eggs laid by female flies in the soil close to the young plants, from spring through to late summer. The maggots then burrow into the roots, and chew off the side roots. The above ground symptoms of infested plants are wilting, gray-green leaves, particularly in hot weather; the lower ones may turn yellow. Even if the plants do not collapse and die, they will remain stunted and produce inadequate curds.

If you mulch around the cauliflowers with fresh compost, the female flies will be less likely to lay their eggs nearby; this is because they are attracted to the smell of brassicas, which the stronger smell of fresh compost may mask.

Treat with a material approved and recommended by your own state university.

Flea beetle: if your seedlings have leaves perforated with small round holes, then flea beetle is the probable cause. These tiny, dark blue or black pests, which hop when disturbed, and the resulting damage, are most often seen during the fine weather in spring. The best preventive measure is to keep your garden clean and weed free. The beetles hibernate in rubbish heaps, wood piles or litter in hedge bottoms; the messier your garden the more encouragement you will be offering them. Because they feed on weeds of the *Cruciferae* family, such as shepherd's purse, the absence of these weeds will be a considerable deterrent. Sevin or rotenone applied as a dust or spray will protect seedlings and young plants.

Cabbage caterpillars: these pests are the larval stage of the cabbage butterfly and the cabbage moth. The cabbage butterfly lays its pointed yellow eggs in clusters on the leaves, usually on the underside. Once the green, yellow and black caterpillars emerge, they feed on the leaves and curds until the leaves are completely skeletonized and the curds destroyed. Whatever parts of the plant remain are fouled by the excrement. The caterpillars of the cabbage moth are light green to start with, hatching from rounded eggs, but change to dark green, brown or black as they mature. These are more difficult to control than the cabbage butterfly caterpillars, because they tunnel deeply into the curds, and may not be discovered until it is too late.

If you see the white cabbage butterflies and grayish-brown moths in your garden, check the leaves for egg clusters; crush any you find between your thumb and fingers. If the attack is mild, remove by hand and destroy any caterpillars you find. In severe cases, spray with Sevin, rotenone or pyrethrum according to manufacturers' instructions.

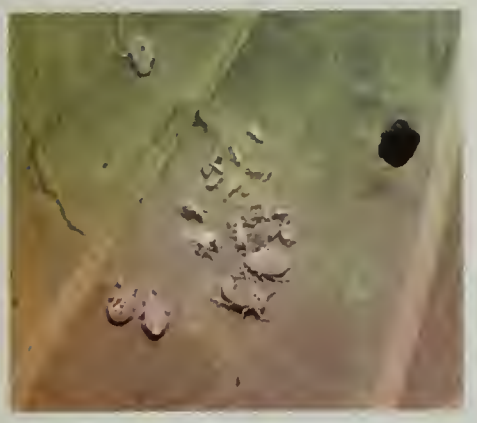
Birds: pigeons are the worst offenders; during winter months they completely strip the leaf tissue from the plants. Netting the plants from the time they germinate is the best solution; scarecrows may give temporary protection.

Cabbage aphids: these pests are much worse in some years than others; warm dry springs and summers encourage them. They feed on the underside of the leaves, which then become curled, discolored and blistered.

Cabbage aphids lay eggs on old Brussels sprouts and cabbage stalks, and also feed on these until the new spring brassicas appear. For this reason it is important to dig up the remains of any cabbage family crops after harvesting

and burn them. Do not put them on the compost heap. If, in spite of this precaution, the aphids do appear, remove and burn infested leaves at once; do not allow the population to build up. In severe cases, spray with malathion, rotenone or Sevin. The first spray may not be completely successful because the aphids are sometimes hidden in the leaves and curds where the insecticides cannot reach. Also, eggs may hatch in the meantime. Spray again as necessary.

Club root: this is the most serious disease likely to affect cauliflower. The aboveground symptoms are stunted plants with wilted, bluish-green leaves. If you dig up the suspect plant and find swollen roots with large, gall-like growths, cut the root open with a spade. If the inside of the gall is clean and fresh-looking, or if there is a little grub in it, then the root is infested with gall weevil. If the inside of the gall is mottled, slimy or discolored, or has an unpleasant odor, then club root is the cause. Dig up and burn all infected plants.



George Hyde

▲ *Aphids feed on undersides of leaves which become curled, blistered and distorted.*

Murphy Chemical Co.

▲ *All brassicas are subject to club root disease; swollen, foul-smelling roots occur.*

The only way to get rid of this soil-borne fungus is to starve it out. Make sure you do not grow any cabbagelike crops in your garden for at least three years. Again get rid of all weeds of the *Cruciferae* family, such as shepherd's purse, as they harbor the disease.

Because club root is associated with acid, badly drained soils, correct any drainage and acidity problems before planting. Test your soil, and if the pH is below 6.0, apply lime to bring it up. Once the soil is infected, liming will help get rid of the disease, but it is a slow process and may take up to 18 months to be fully effective.

Downy mildew: the symptoms of this fungal disease are soft white patches, usually on the underside of the leaves. However, the main body of the fungus is inside the plant's tissues. Seedlings under glass are frequently infected. As with club root and cabbage aphids, shepherd's purse is a host plant; make sure your garden is weed-free. Remove badly infected seedlings or plants and spray the remainder with an approved fungicide. Under glass, improve the ventilation, and obtain drier conditions.

Blackleg: the fungus which causes damping-off in seedlings can also infect young plants, and it is then called blackleg. These plants develop hard, brown withered stem bases. It is not necessarily fatal, but infected plants will be stunted and crop poorly.

Blackleg is most likely to occur in wet, overcrowded conditions; thin seedlings before they become overcrowded and avoid overwatering.

GUIDE TO CAULIFLOWER TROUBLES

Symptom	*Probable cause*
Wilted gray leaves, tunneled roots	Cabbage root fly
Small round holes in leaves	Flea beetle
Leaf tissues stripped	Cabbage caterpillars Birds
Curled, discolored, blistered leaves	Cabbage aphids
Swollen rotting roots	Club root
White patches on leaf undersides	Downy mildew
Hard brown stem bases	Blackleg
Thin, straplike leaves	Whiptail

Whiptail: this physiological disorder is due to a lack of molybdenum, a trace element. Affected plants will develop straplike, ruffled leaves, reduced to little more than the midrib and the curds may be stunted or nonexistent. It usually occurs in very acid soils, so liming as previously recommended, will help. Otherwise the application of fritted trace elements can be tried, together with mulching with plenty of well-rotted manure or garden compost; this will help to make various minerals available over the long term.

Cabbage gall weevil: gall weevil and club root have similar symptoms, and it is sometimes difficult for the gardener to distinguish one from the other. Both cause misshapen roots, but gall weevil is much less serious. The white, legless grubs bore into the roots, which then form rounded hollow swellings, or galls. If there is a severe infestation, several galls may join together to form a large chamber containing many grubs. Stunted plants and poor harvests will result from bad attacks.

When transplanting cauliflowers, check the roots for gall weevil. If there are only one or two galls on a root, then cut them off with a sharp knife; discard and destroy any severely infested plants.

Ministry of Agriculture, Fisheries & Food

▲ *The hard, brown withered stem bases are caused by blackleg; plants will crop poorly.*

Harlequin bug (calico back, fire bug): this is a serious problem in the South for cauliflowers and others of the cabbage family (brassicas). Bright red markings on black give this small flat bug its name. When attacked by harlequin bugs, plants wilt, turn brown and eventually die. To control this nuisance in areas where it occurs, it is important to clear out and destroy remnants of any cabbage family plants after harvesting and to keep gardens free of weeds and debris. Heavy use of a safe insecticide and removal of the bugs by hand are other helpful measures to be taken.

Root-knot nematodes: another major problem in southern states, these microscopic wormlike creatures cause galls on the roots of cauliflowers and other brassicas. Remove and destroy badly infested plants and sterilize the soil with an approved fumigant before planting there again.

growing ideas

A Celery Substitute

If you like the taste of celery, but find it a difficult crop to grow, then try celeriac—an undemanding, unusual and delicious root vegetable with a celery flavor.

Celeriac (*Apium graveolens rapaceum*) is a close relative of celery, but it is grown for the swollen rootlike stem below ground rather than for the slender stems appearing above the soil. Also known as turnip-rooted celery or knob celery, celeriac is easy to grow and will thrive in most soils and situations. It is a particularly good crop if you like celery but have difficulties growing it. Try a crop of celeriac to add an aroma and flavor of celery to winter soups and salads. You can also blanch the stems and eat them.

If you want to grow celeriac, choose a site in your garden which is fairly sunny and has some shelter. Celeriac likes a reasonably rich soil, although not excessively so, and one which provides a steady supply of water; hence a slightly heavy soil will give better results for less trouble than a light one. Ideally the site should be one which had a generous application of rotted manure or garden compost dug in during the previous autumn. However, do not be discouraged if your soil does not meet this ideal; ce-

R. J. Corbin

Celeriac ready for lifting: primarily a root crop, the blanched stems are also eaten.

leriac is quite happy in most soils so long as they are well-drained, and water can be supplied in dry weather.

Because celeriac needs quite a long growing season, four to five months from sowing to harvesting, it is advisable to sow the seed in boxes in cold frames, under plastic tunnels or in a slightly heated greenhouse. This is particularly important in cold climates, for celeriac seed will not germinate unless the soil temperature is at least 60° F (15.5° C), and this may not be reached until midspring, or later.

Sowing should take place in early spring. Fill seed flats with a good quality seed mixture; sow the seed about 1 in (2.5 cm) deep. Cover lightly with soil. A little heat will help the seed to germinate quickly. (You can also sow them directly into peat pots, putting three seeds in each pot.) When the seedlings are large enough to handle, just before they reach the four-leaf stage, transplant them either into flats or singly into peat pots kept in a frame, or into the open ground, protected by plastic tunnels. Allow a spacing of about 2 in (5 cm) between seedlings. Seedlings already in peat pots should be thinned to a single plant.

Whether they are in flats or in the open ground under cover, the seedlings will need to be hardened off during the spring. Begin by opening the frame or removing the protective covers for a few hours at midday on sunny days. Gradually lengthen this period until it is warm enough and the seedlings are strong enough to dispense with protection.

The young plants will be ready for transplanting to the permanent bed in late spring, when there will already be a slight swelling of the root. Put the plants in rows spaced 12–15 in (30–37.5 cm) apart; space the plants 1 ft (30 cm) apart in the rows. Be sure to handle the plants very carefully and to avoid damaging the swelling root, which should be placed level with the soil surface rather than below it. Celeriac requires little care and cultivation during the growing period. Just after transplanting, water the young plants thoroughly, and be sure that they have enough water if the weather is dry during the main growing period, otherwise the root will not swell to its full size.

Apart from watering, the only care necessary during the summer growth period is weeding. Use a hoe to keep the bed weed-free, and be careful about weeding close to the plants so as to avoid damage to them at soil level. If you would like extra-large roots, regular liquid feeding from midsummer to early autumn will help. Toward the end of late summer, sideshoots will start to sprout from the crown; these should be removed. At the same time, scrape away the soil around the root so that at least half of it is exposed.

Later, celeriac should be earthed-up to protect it from frost and to keep it from being bitter-tasting. Do this in midautumn, or earlier if frosts threaten. Draw up soil to cover the root completely and at least 2 in (5 cm) of the stems. If you want to blanch the young stems as well, do this at the same time by wrapping sheets of black polyethylene around the stems, leaving a bit of leaf exposed at the top, then earth-up the entire length of the stems.

Blanched stems should be ready for cutting in late autumn. You can lift the roots as required from early autumn onward. Celeriac will tolerate moderate frost, and can be left in the ground through the winter if well mulched.

However, if heavy or prolonged frosts are predicted, or if you live in an area where the winters are always severe, you would do better to lift the entire crop at the end of autumn and store it in boxes of dry sand, peat or soil, and remove all the leaves but the small ones in the center. If the boxes are kept in a dry, frostproof place, you should be able to enjoy celeriac during the winter and into early spring.

There is a very little aftercare required from a crop of celeriac. If you choose not to eat the stems, consign them to the compost heap, if they are free of pests; otherwise, put them on the bonfire.

Celery

Apium graveolens
(fam. *Umbelliferae*)
Biennial, grown as an annual
Size: 12–20 in (30–50 cm) high, 3–4 in (7.5–10 cm) in diameter
Sowing to harvesting time: 15–20 weeks; mature plants of winter celery may be left in the ground for several more months and lifted as required
Yield: 12–15 plants, each 1½–2 lb (0.7–1 kg), per 10 ft (3 m) row

Celery has long been considered a specialists' crop, largely because of the labor and skill thought to be involved in trenching and blanching. In fact, these operations are not particularly difficult or time-consuming. Self-blanching and green varieties are now available if you want to grow celery with a minimum of effort.

There are two basic types of celery grown in America—self-blanching and green, grown for its green stalks. Both are primarily cool-weather crops.

While the blanching type is grown more often as a spring-sown summer crop and the green later for fall or winter because it is hardier and stores well, this is not entirely so. In fact, the green varieties are becoming more popular in the United States for all seasons. In the North, celery is grown primarily as a spring-sown crop for summer and early fall use. However, as one goes south, celery is grown increasingly as a fall and winter crop culminating in parts of Florida and California where winter is clearly the best season to grow it.

Celery is available in dwarf or tall forms. If you have a small family, or do not use a lot of celery, select a dwarf variety for planting. Celery is at its best when eaten fresh; there is no point in growing giant varieties if it takes days for your family to finish one bunch, even though you can grow it in your climate.

The summer varieties are creamy-white, stringless, and have a milder flavor than the winter types. These are less hardy, and must be harvested before the first autumn frosts. They are not strictly speaking self-blanching, but simply contain less chlorophyll than the winter varieties.

Green celery, often for autumn harvesting, is hardy and grows happily outside, requiring no blanching.

Suitable site and soil

Choose a sunny open spot; celery does not do well in the shade. Like wild celery, which grows in marshes, cultivated celery needs plenty of water. The water supply must be continual as well as abundant; if celery suffers from lack of

SOWING CELERY

1. Sow the seeds under glass in late spring. Sow them thinly in seed mixture; cover with a fine layer of the same.

2. When you can hold the seedlings between finger and thumb, transplant them 2 in (5 cm) apart into boxes.

water at any time during its growing period, stunted plants or bolting may result.

Celery needs deep, fertile, well-drained soil. It also needs soil which can retain moisture; it grows best in lowland conditions. Sandy soils are least suitable because they tend to dry out in summer. Avoid badly-drained or heavy clay soils, which can become waterlogged. Celery is a very greedy feeder, and can be grown on well-rotted manure or garden compost without any soil added.

Raising seedlings

The sowing procedure for winter and summer celery is basically the same. Sow winter varieties in late spring to eat in early winter. Where possible, sow later, for harvesting in mid or late winter. Summer and green celery are usually sown in midspring, because earlier sowings may bolt, while later ones may be injured by frost.

If you are growing celery from seed, make sure it is guaranteed disease-free. Always wash your hands after dealing with celery seeds as they are treated with strong chemicals to prevent disease. Never use seeds intended for sowing to flavor food.

Celery seeds are slow to germinate, and may take up to six weeks even in a cold frame; germination can be patchy outdoors. Because of this, it is safer to start the seeds under glass. Sow the seed thinly in a friable potting mixture and cover with a thin layer of the soil. Germination will not take place unless a temperature of 60–70° F (15–21° C) is maintained; germination will be quicker if the temperature is higher.

When the first true leaf appears, transplant the seedlings into boxes, spacing them 2 in (5 cm) apart. Now you can lower the temperature to 60° F (15° C). When they are growing well begin to harden them off before finally planting out. To get a longer season for celery, and avoid a sudden glut, do not plant the seedlings out all at once. Transplant the most advanced seedlings first, leaving the slower ones to plant out at weekly intervals.

Growing winter celery

Preparation for planting should be done well in advance. Dig a trench 15 in (37.5 cm) wide for a single row of plants, 18 in (45 cm) for a double trench. If you are digging more than one trench, leave 4–5 ft (1.2–1.5 m) between trenches.

Dig out 1–2 ft (30–60 cm) to start with and fork over the bottom of the trench. Replace some of the soil with plenty of manure, garden compost or grass cuttings. If you cannot get farmyard manure, old hops are a good substitute.

WINTER CELERY

1. Dig a trench 15–18 in (37–45 cm) wide and 1–2 ft (30–60 cm) deep. Fork over bottom of trench to loosen soil; work in organic matter. Then cover with 3–4 in (7.5–10 cm) topsoil. Make finished trench level 6–10 in (15–25 cm) lower than ground. Space plants 9 in (23 cm) apart.

2. If your soil is not too dry, plant quick catch crops on the ridge of soil next to the trench. Lettuce, dwarf beans, or radishes can be raised this way and harvested before the soil is needed for earthing-up.

Then cover the organic matter with 3–4 in (7.5–10 cm) of soil until you have the finished trench level. The final depth of the trench varies according to soil and drainage conditions. A finished trench level 10 in (25 cm) is best for light sandy soil. On heavy clay soil the trench can be 6 in (15 cm) deep.

Pile up the soil from the excavation alongside the trenches in neat ridges. If the soil is not too light, you can grow quick catch crops, such as lettuce or radishes, on them until you need the soil for earthing-up in late summer. The crops will be harvested before then. All this is assuming you want blanched (bleached) celery. If not, plant green sorts on a fill-in or leveled trench.

Planting out

Two weeks before planting, apply superphosphate at the rate of 2 oz per sq yd (60 g per sq m). Right before planting, clean out of the trench bottom any soil which has crumbled in from the sides.

3. When 12–15 in (30–37 cm), begin earthing-up. Remove sideshoots, suckers and tiny leaves; remove and destroy slugs. Wrap plants in newspaper and tie with raffia to keep soil from getting into celery heart. Place 4 in (10 cm) soil from adjacent ridge around base of each plant. Earth-up gently to avoid bruising.

4. Earth-up twice more. Each time add another 4 in (10 cm) to the soil around the plants. After the final earthing-up, only the leaves should be visible. Finish the ridge off neatly with smooth sloping sides.

Then thoroughly drench the trenches with water.

Plant out the young celery in early summer. Be careful not to disturb the rootballs when transplanting; it is best to use a trowel when lifting and planting them. Set the plants in either a single or double row, with a spacing of 9 in (23 cm) in all directions. For the first few days after they have been planted out, cover the plants with newspaper tents to prevent drying out.

Care and development

The main requirement of all young celery plants is a continual supply of water. If the plant is allowed to dry out, coarse growth and tasteless hollow leafstalks will result. Organic top-dressings are not usually needed. Do not apply nitrate-rich fertilizer because excess nitrogen makes the stalks cracked and frothy. Keep the trenches weed-free; pick off and burn any leaves infested with insects. If the plants are throwing out side-

5. When harvesting blanched celery, scrape back the soil until you see the roots.

6. When the roots are exposed, place your fork well down into the soil to avoid damaging the stems. Lever out the plant, being careful not to damage adjacent plants.

shoots or suckers, remove them, as all growths should come from the center of the plant.

Blanching

This is usually started when the plants are 12–15 in (30–37.5 cm) high. Choose a fine day, when the ground is reasonably dry. Check again for sideshoots and suckers, and remove any tiny leaves which would be buried by the process of earthing-up. Remove and destroy any slugs in the trench.

Wrap the plants in newspaper and tie with raffia. This keeps the soil from getting into the heart of the celery; if soil gets into the center of the plant, rot may set in. An alternate method of tying the stalks together is to use a long length of garden twine, twisting it round the top of each plant. Remove the twine when the final earthing-up is completed.

To begin earthing-up, rake the loose soil from the adjacent ridge down into the trench bottom. Place around the base of each plant 4 in (10 cm) of soil. Do this gently. Never apply fertilizer to the soil which is used for earthing-up, as it can damage the stalks. Earth-up around the plants twice more, in late summer and in autumn. Each time add another 4 in (10 cm) to the soil around the plants, until only the top leaves are showing.

When earthing-up is finished, the trench should be filled in and formed into a ridge on the top. Finish the ridge off neatly, with smooth sloping sides. This helps throw off the rain.

There are other methods of blanching besides earthing-up. These are often used by exhibitors to keep the celery free of soil. You can sometimes buy special celery collars which are about 6 in (15 cm) high; these should be tied around the celery with raffia or elastic bands. Collars are placed one on top of another over the plant at three-week intervals until the celery is completely covered. You may have to fix the topmost collar to a stake or cane to keep it from sliding down onto the lower collars. Heap soil around the collars to keep them from blowing in the wind; this also improves the blanching.

You can make your own celery collars from pieces of tar paper 6×12 in (15×30 cm). The tar backing will discourage slugs and worms, and will keep the paper from disintegrating in wet weather. You should lift the rings off every two weeks or so to inspect for slugs and cut off any dead leaves; replace the collars as soon as possible.

Earthenware drainpipes are also sometimes used for blanching, starting shortly after the plants are in the

trenches. The drainpipes protect the young plants from drying wind as well as sunlight.

Protection and harvesting

Once earthing-up has been completed, blanched celery can remain in the ground for several months. Leave the plants in the ground for at least six to eight weeks after the last earthing-up. This will complete the blanching process, and moderate frost improves the flavor. In either case, lift the heads as you need them.

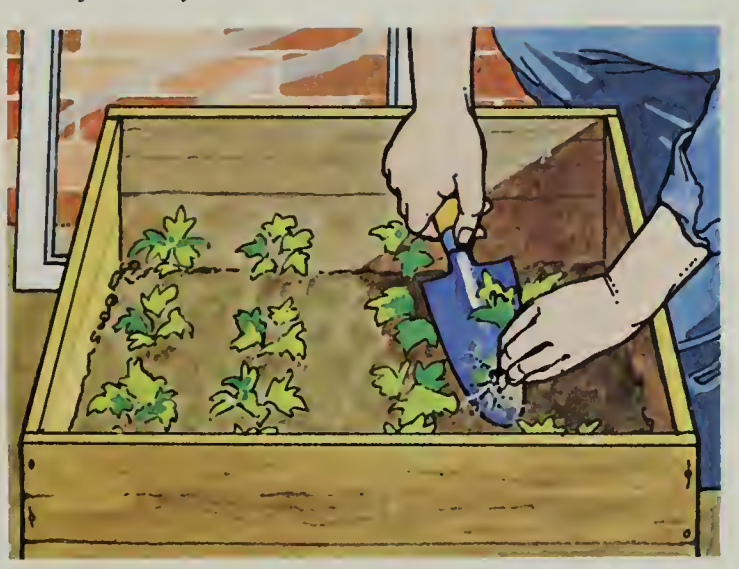
In very bad weather, protect the plants from frost and rain by covering with clean straw or old hay. Alternatively, place two boards on edge along the row; this will help throw off the rain as well. A third method of protection is to place waterproofed paper along the row, folded down the middle in a tent shape. Fix the paper with crossed canes so it cannot be blown away by the wind.

A crop of blanched celery in midautumn; earthing-up has been completed.

Iris Hardwick

SUMMER CELERY

Transplant young plants into frames or outdoors, depending on weather conditions. Space them 9 in (23 cm) apart in each direction. Cover only the roots with soil; if the stems are covered, suckering will be encouraged. Water in well after planting.



When harvesting, work your way down one row at a time, lifting the heads in order. Carefully remove the earthed-up soil from around the plant you are lifting until you can see the roots. Then place your fork under the plant and lever it out. Be careful not to damage adjacent plants.

If a heavy or prolonged frost threatens, you can lift a few heads of celery in advance and store them until needed. Dig the plants out, complete with roots, before the ground becomes frozen solid (unless it is heavily mulched to prevent freezing). Remove any damaged stalks and outside leaves and pack the plants upright in a box filled with a layer of moist sand. Store the boxes in a cellar or shed, where the temperature is just above the freezing point. Keep the soil moist until all the celery has been used.

After harvesting, put the leaves, outer stems and roots on the compost heap and level the ridges. The soil is already enriched for succeeding crops. Do not replant the site with carrots, which are a member of the same family, to prevent the build-up of pests and diseases.

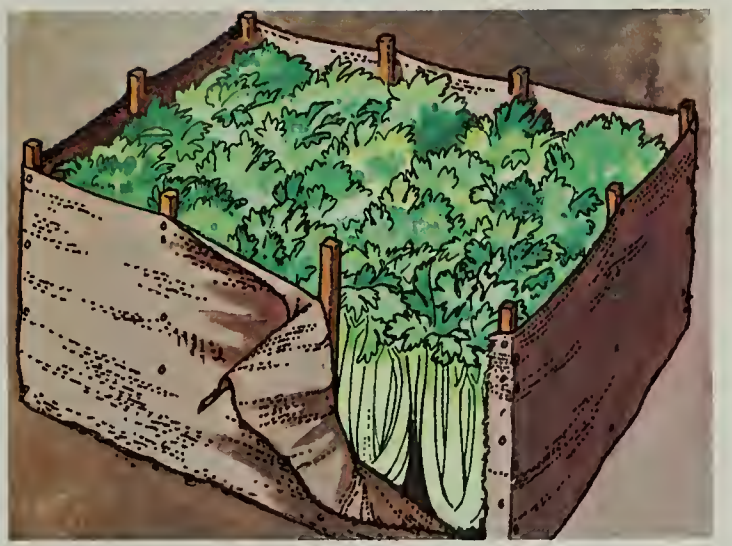
Growing summer celery

Summer, or self-blanching, celery is sometimes not grown in trenches, but in prepared beds. It is basically less hardy than winter celery, and matures earlier in the season. Bring on your seedlings as described above.

Although it is called "self-blanching," summer celery will be whiter if it is shaded from sunlight. You can either start it in the open or in a cold frame. If you are growing it in the open, plant the celery in large, square blocks, say seven rows of seven, so that the outer plants cast shade on the inner ones and blanch them.

To grow summer celery in the open, prepare the soil as outlined above, digging in manure or compost at the rate of one bucketful load per sq yd (sq m). Plants are grown spaced 9 in (23 cm) apart in each direction. Erect a framework around the plants, and cover it with sacking, hardboard, or black plastic sheeting to keep the outside plants blanched. As with winter celery, keep the weeds down and never let the soil dry out.

It is easier to blanch summer celery in an unused cold frame, because the frame sides keep out the light. Prepare the soil well in advance, mixing in manure or garden compost. The soil mixture must be moisture-retentive, so add plenty of peat. Set the plants out in late spring or



To improve the blanching of summer celery, plant it in square blocks. Erect a framework of stakes and sacking or plastic around the plants to exclude light. As rows are harvested move the frame in, to shade remaining celery.

early summer, depending on sowing time and weather conditions. Plant them in rows 9 in (23 cm) apart covering only the roots with soil. Carefully firm the soil around the roots. Do not bury the stalks, as suckering will be encouraged. Immediately after planting the celery, water thoroughly. Keep the frame glass on for the first couple of days after planting. For a further week or so, leave the frame open a bit during the day, shutting it at night.

To make full use of the cold frame, interplant the young celery with lettuce sown in midspring. The lettuce should be ready for harvesting in midsummer, before the celery is ready for blanching.

Keep the frames well weeded, inspect frequently for slugs, and make sure the soil never dries out. In midsummer, after the lettuce is lifted, dress the celery twice at ten-day intervals with a mixture of one part old soot to three parts lime. Dust the plants with this mixture early in the morning and wash it off the next morning with a hose or watering can with a fine rose. Alternatively you can improve the blanch of summer celery, whether open grown or in a cold frame, by packing clean dry straw in between the plants to a depth of 9 in (23 cm). Dust the straw with pyrethrum powder to keep the wood lice away. Loosen the straw with a fork after heavy rains, so that it does not compact around the stalks and damage them.

Green celery

This celery is eaten green and is rapidly becoming the favored kind in the United States. As it is hardy and is not meant to be blanched, it is best grown in the open ground rather than a cold frame. Set the young plants outdoors in early summer, 9 in (23 cm) apart and 12 in (30 cm) between rows. Give protection to young plants until they are fully established.

Harvesting and aftercare

Summer celery is harvested from late summer to midautumn. It should be cleared before the autumn freeze-up. If blanched celery is open-grown, remember to move the framework as you lift the plants, to keep the remaining plants blanched. Fill holes left by individual plants with clean dry straw, to prevent sunlight reaching the other celery. The general points about clearing up after winter celery apply here too.

In cold climates, there are ways to store late-maturing celery in the garden for a month or two. One method uses soil gradually banked around the plants,

R J Corbin

It is easy to get well-blanched summer celery by growing it in a cold frame, as the sides of the frame keep out the light.

reaching to the top by the time temperatures freeze. As it grows colder, cover the banking with straw or something that will provide protection and ventilation.

Or you can dig a trench 10–12 in (25–30 cm) wide, about 24 in (60 cm) deep and long enough to hold the crop. Dig up the fully-grown plants with a clump of soil at the roots and pack them in the trench. Water them and let the tops dry before covering with a sloping roof made of boards or poles leaning on a board on edge on one side of the trench to the ground on the other side. Over this framework, spread a light covering of material, such as straw, that will pack closely. Add more as it gets colder. This method keeps celery through late winter.

Exhibition tips

Timing is a main consideration when planning to show celery. For a late summer show, you must sow the seeds in midspring in a well-heated greenhouse. Transplant the seedlings into 5 in (12.5 cm) deep containers, and continue growing them under glass until they can be hardened off outdoors in frames. Plant out in early summer, with protection for the first few days.

Exhibitors use many methods of blanching: tar-free roofing felt, paper

collars made of stiff brown paper 5 in (12.5 cm) wide and tied with raffia, or land drain pipes 4–6 in (10–15 cm) in diameter, partially filled with sawdust. Follow cultivation for ordinary growing. To select celery for showing, unwrap and throw away all coverings. Tie string gently around the tops of the plants so that the stalks do not fall away. Dig them up, chopping away most of the roots with your spade.

After carefully lifting the celery you wish to exhibit, wrap it in clean damp paper with the roots standing in water. Do not expose the celery to light if you are blanching it.

Right before the show, lay the celery out on a table, removing the temporary tie from the top. Also remove any damaged or unwanted stalks and leaves. Trim the roots back to the hard base, leaving a pointed shaped piece at the butt. Then hold it upside down and wash with a strong spray of water from a tap or hose until it is free of all soil. Never scrub celery, or you will damage and bruise the skin. Then tie around the celery where the foliage joins the stalks and wrap it up again with clean cloth or paper.

Be careful when handling the celery, because it is very brittle and mishandling can lead to breakage.

A single dish frequently contains three bunches of celery, exhibited so they lie flat on the bench. If the celery is entered as part of a collection of vegetables, then six bunches of celery are often shown, usually staged at the back of the exhibit. Right before the judging, you can spray with a fine mist of water, to revive the stalk and foliage.

The judges will look for large solid bunches without any coarseness or flower stems. The leaf stalks should be thick, well-blanched, clean, brittle and free from damage by pests or diseases.

Small, coarse, loose bunches with visible flower stems will not win prizes. Obviously, bunches with diseased foliage or with stringy, soft, imperfectly-blanched or pest-damaged stalks will also be considered defective.

Pests & Diseases

As much a part of the vegetable gardener's world as planting, mulching, thinning and harvesting are the pests that thrive on growing plants and the diseases that weaken and sometimes kill the plants. Beginner as well as veteran gardeners are well advised to rely not just on the chemical controls to fight these problems, but to practice what might be called "preventive gardening."

The measures that can be taken start with crop rotation and proper preparation of the soil and extend to a good cleaning of the garden after harvesting your vegetables. In between, make it a practice to purchase disease-resistant seeds and seedlings wherever possible, correct badly drained soils, avoid overcrowding, keep the garden weed- and trash-free, provide sufficient fertilizer and promptly remove and destroy all diseased plants. Know and provide the best growing conditions for the particular vegetables you plan to grow as this makes them more resistant to many diseases and pests. Furthermore, some pests, caterpillars for instance, can be removed by hand.

Celery leaf tier: the major insect pest, a small greenish caterpillar that webs the leaves together and also bores into the stalks. Spray with pyrethrum, rotenone or Sevin promptly and repeat as needed. All are nonpoisonous.

Leaf hoppers: these tiny insects usually do not cause serious damage directly but are carriers of serious virus diseases. The beet leaf hopper transmits curly top to celery and the six-spotted hopper, the troublesome yellows. Again, apply pyrethrum, rotenone or Sevin sprays promptly and as needed.

Early and late blights: both produce small, more-or-less yellowish spots on the older leaves and stalks. Later the spots turn dark. Avoid successive crops of celery, lettuce, or the cabbage family

in the same locations. Do not touch or brush against the plants when wet and spray with a remedy approved by your state authorities.

Aphids: tiny fat insects that suck the plants' juices and are unpleasant to find when harvesting. Control with the same nonpoisonous pesticides mentioned above.

Slugs: these common garden pests may feed on the leaf stalks. Eventually, considerable damage may be done to the heart, and the celery may be ruined for eating or exhibition. They feed at night, leaving silvery slime trails behind them; during the day they hide in dark plant debris, under pots or boxes. Apply metaldehyde bait to the soil, repeating if necessary.

Celery leaf spot: this is a fungal disease prevalent in wet summers and can spread rapidly by means of spores. It is seen on the leaves and sometimes the stalks as small brown spots with little black fruiting bodies developing eventually. The disease is seed-borne; the best precaution is to buy treated seed. But remember that these treatments are only a precaution, not necessarily a guarantee that the disease will not occur.

If an attack develops, spray seedlings and young plants with an approved fungicidal compound. Remove and destroy all infected leaves as soon as you see them. Give the plants an extra application of potash-high fertilizer to avoid soft growth, which is particularly susceptible. Where the attack is very bad, disinfect the frames with a two percent formalin solution.

Celery heart rot: this is due to bacteria which can turn the center of the plant into a soft, brown, slimy mess which frequently extends up the stalks. The bacteria can only enter the plant through wounds, such as those caused by slugs, careless cultivation, or frost. Earth-up only when the soil is friable and dry. In severe weather protect the foliage, as the rot sometimes enters from the top of the plant and works its way down. Another precaution is to change the site for planting celery every four or five years, as the bacteria build up in the soil. Make sure slugs are controlled, as they are often a cause of the primary wound that allows the bacteria to enter.

Boron deficiency: if your celery is stunted, with yellowing, withered leaves and dark cracks in the stalks, it is probably suffering from boron deficiency. To correct, step up feeding with organic matter—seaweed is particularly good, or spray with a very dilute solution of borax.

Murphy Chemicals Ltd

Damage to the leaves of celery can be caused by disease or pests.

Royal Horticultural Society

Damage caused by slugs feeding on the stalks of celery. Control with slug baits.

GUIDE TO CELERY TROUBLES

Symptom	*Probable cause*
Leaves rolled up or webbed together	Celery leaf tier
Tiny insects hop away when disturbed	Leaf hoppers
Yellow spots on leaves, turn dark later	Early or late blight
Leaf stalks eaten, silvery slime around plants	Slugs
Small brown spots with black fruiting bodies on leaves	Celery leaf spot
Center of plants brown, slimy, rotten	Celery heart rot
Celery stunted, yellow withered leaves, dark cracks in stalks	Boron deficiency
Seedlings die, fall over; roots discolored reddish-brown	Damping-off
Plants stunted, leaves mottled, distorted	Arabis mosaic virus
Celery bolts, stalks split and frothy	Nitrogen excess

Damping-off: young plants and seedlings will wilt and die when infected with damping-off fungus. The roots are usually discolored reddish-brown. Overcrowded seedlings, or those growing in too wet soil or very high temperatures are particularly susceptible. Seeds prepared with a preventive dressing are less susceptible. If seedlings are attacked, spray with a control approved by your state authority. Take care not to overwater or overfertilize seedlings.

Virus diseases: there are several virus diseases which affect celery, including cucumber mosaic virus and arabis mosaic virus. Yellowing, mottling or chlorosis of the leaves and stunting of the plants are symptoms of virus infections. Cucumber mosaic virus can be transmitted from cucumbers and spinach, so do not plant celery too close to them. Arabis mosaic virus is transmitted by eelworm, so avoid planting in eelworm-infested soil.

Nitrogen excess: if there is an excess of nitrogen in the soil the celery may bolt and stalks split. Correct this by applying 1½ oz (45 g) of superphosphate and ½ oz (15 g) sulfate of potash per sq yd (sq m) or give less organic matter.

Ministry of Agriculture, Fisheries and Food

Celery leaf spot is a serious fungal disease; buy treated seed as a precaution.

Murphy Chemicals Ltd

Celery is subject to attack by mosaic viruses; infected leaves are mottled and pale.

Varieties

American Green: crisp and tender without blanching; spring-sown, crops in October.
Cornel: a new early sort, resistant to yellows. Stringless, it does well on both upland and muck soils.
Florida 683: popular in North for later crops. Bushy with good heart formation; high rib count.
Fordhook: a good fall and winter sort; silvery white, if blanched. Crisp, tender.
Giant Pascal: old favorite, tall and solid; nutty flavor. Keeps well in and out.
Golden Plume: very early; fast grower. Yellow; blanches easily.
Golden Self-blanching: free of strings; flavorful. Compact, blanches to waxen yellow.
Improved Utah: very early, compact, popular dark green commercial variety.
Non-bolting Green: early; a Pascal type resistant to bolting.
Summer Pascal: useful in South, a good green unblanched. Blight-resistant.
Tall Utah: another improved Utah; popular for the market.
Tendercrop: early, productive; good quality. Ribless.

Harry Smith

▲ *Giant Red, popular abroad.*

Harry Smith

▲ *Golden Self-blanching*

National Vegetable Research Station

▲ *Giant White, a favorite in England.*

Brian Furner

▲ *Summer Pascal*

Cherries

SWEET CHERRY
Prunus avium (fam. *Rosaceae*)
Hardy deciduous tree with useful life of 50 years or more
Size: 40–60 ft (12–18 m) high, 49 ft (15 m) across
Planting to harvesting time: 3–4 years after setting out
Yield: 220 lb (100 kg) per tree

SOUR CHERRY
Prunus cerasus (fam. *Rosaceae*)
Hardy deciduous tree with a useful life of 50 years
Size: 20–30 ft (6–9 m) high, 30 ft (9 m) across
Planting to harvesting time: 2 to 3 years
Yield: 40–50 lb (18–22 kg) per tree

Cherries belong to the same family of trees as peaches, plums and apricots. Their white blossom is a welcome sight in spring, and they stay in bloom longer than any other fruit tree. Even the most neglected tree may bear a small crop, but a well-tended cherry will produce large quantities of succulent fruits. Cropping is from early summer to early autumn, depending on the variety. Later in the season, there is a modest display of autumn leaf color. All types of cherry are long-lived, and once established they need only simple cultivation and pruning routines; even the smallest garden should have room for a dwarf such as North Star.

Fruiting cherries are divided into two types, the sour *Prunus cerasus,* which need cooking, and the sweet *Prunus avium* which can be eaten raw. A third type, the *Duke* variety, is a cross between the two. It is useful for both dessert and for cooking, although the fruit is inferior to the best of the other two varieties.

Sweet cherries
These are much stronger-growing than sour cherries, and are usually available as standards (trees that will grow to full size). There are no dwarfing rootstocks. As standard forms eventually make trees up to 60 ft (18 m) high, they are not really suitable for a small garden, except the naturally dwarf North Star, which is also self-fertile.

A second point to bear in mind is the cherry's self-sterility: usually one sweet cherry tree grown by itself will not produce fruit. There has to be a suitable variety nearby to pollinate the flowers and it takes a large garden to accommodate two fully grown sweet cherry trees. Their large size also makes it difficult to net them against birds.

Sweet cherries flower early in the sea-

K. Bloomfield MC Courtesy R.H.S. Gardens Wisley

▲ *A fan-trained Morello cherry, in early spring, before the blossoms have appeared.*

son, before sour cherries and apples, and are therefore more susceptible to frosts; a sunny sheltered site suits them best.

The fruit is generally heart-shaped, and varies in color from nearly yellow to almost black. They are the earliest tree fruit to mature, cropping from midsummer onward. In nursery catalogues, sweet cherries are often divided into two groups according to the color of their juice. Black varieties have dark red juice and white varieties have colorless juice. They can further be subdivided into heart cherries, with soft tender flesh, and Bigarreau cherries with firm, "breaking" flesh.

Sour or pie cherries

Sour cherries are easier to cultivate than sweet cherries for a number of reasons. Both are particular about soil requirements, but sour cherries will tolerate a heavier soil than sweet cherries. They flower later than sweet cherries, so the blossom is less susceptible to frost. They are also self-fertile, so a single tree will set fruit, though cross-pollination will usually produce a heavier crop.

As sour cherry trees do not grow as large as sweet cherry trees, they can be more easily accommodated in a small garden. They are more adaptable to training and hard pruning, and may even be successfully grown as bushes or fan-trained against walls. Because of their small size, they are easier to net against birds. They also require less sunlight than sweet cherries.

Most of the sour cherry varieties are red, but Morello, probably the most popular, turns almost black when it is left to ripen on the tree.

Site and soil requirements

A warm sheltered site is ideal, open to the sun. Because they ripen earlier than any other tree fruit, sweet cherries need lots of sunshine. They should only be

PLANTING

Make sure the graft join between the scion and the rootstock is 3 in (7.5 cm) above ground level.

grown in areas where there is a reliable amount of summer rainfall to provide a steady supply of water for the ripening fruit. If the water supply is insufficient or sporadic, small dry fruits or split fruits may result. Sweet cherries do not do well in the extreme southern states with their long and extra-hot summers and periods of high winter temperatures.

Frosts at flowering time can be disastrous, so avoid valley bottoms and low-lying frost pockets. A slight slope on open ground with room for cold air to drain away is helpful. You can get a quick, general indication of the suitability of the site by seeing if there are any ornamental cherry trees flowering in your area, and how well they are doing—the requirements for flowering and fruiting cherries are similar.

Cherries will grow in a variety of soil types, but the main requirement is good drainage. Light loam is particularly suitable as it is free-draining but retains some moisture. Very heavy soils will cause poor growth and small crops; very free-draining sites, such as shallow soil over gravel or sand, also cause problems because they tend to dry out in summer and tend to result in fleshless, dry fruits. Much can be done to correct these drainage problems in preparing the soil prior to planting, and a healthier tree with an improved crop yield will result.

FAN-TRAINING

1. Cut the main stem of the whip back to a growth bud 12–18 in (30–45 cm) high in early spring. Make sure there are between 2 and 4 growth buds on the stem; two should be opposite each other at least 8 in (20.5 cm) up from the ground (AB).

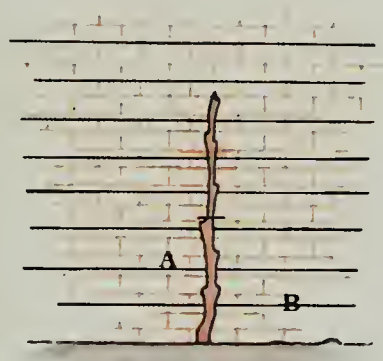
2. When the two opposite shoots (AB) are 18 in (45 cm) long, tie them, and any other shoots, to long bamboo canes; gradually lower the angle of the lower two (CD) so that by midsummer they are at 45° angles to the ground. If one shoot grows more rapidly than the other, lower the bamboo cane (D) to impede the flow of sap until the slower shoot has caught up.

3. The following spring, shorten the side branches to a bud 12–18 in (30–45 cm) from the main stem (ABCD). Cut out all growth above and below selected branches.

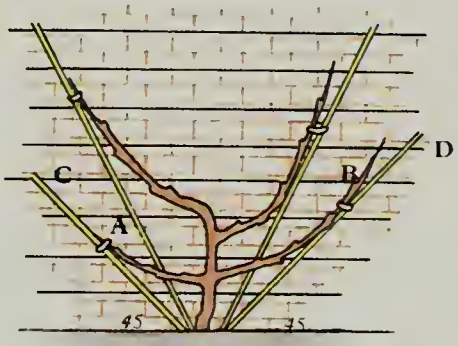
4. During the following season, extension shoots will grow from each of these side branches, and should be tied in (ABCD). Six or eight sideshoots will grow along the lengths of these branches. Select two vigorous shoots on the upper side of each branch, and one on the lower side. Rub out any others. These selected shoots form the main framework of the fan; tie them to the wires.

5. The third spring the tree has been in your garden, cut back these branches to a bud, leaving 2½–3 ft (75–90 cm) of ripened wood (A). If the wall or fence is large, continue this schedule for another year; otherwise prune for fruit production.

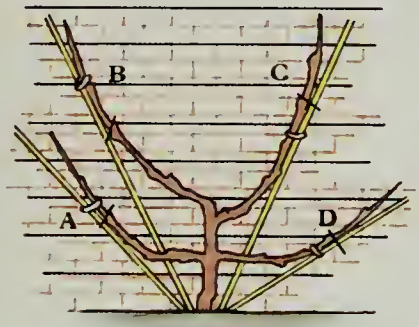
MORELLO CHERRIES



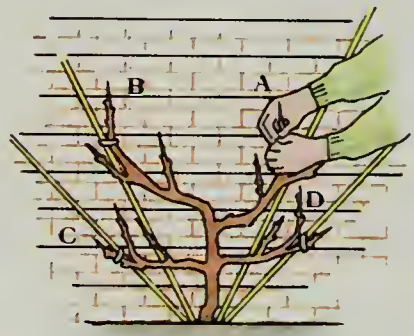
1. Newly planted whip



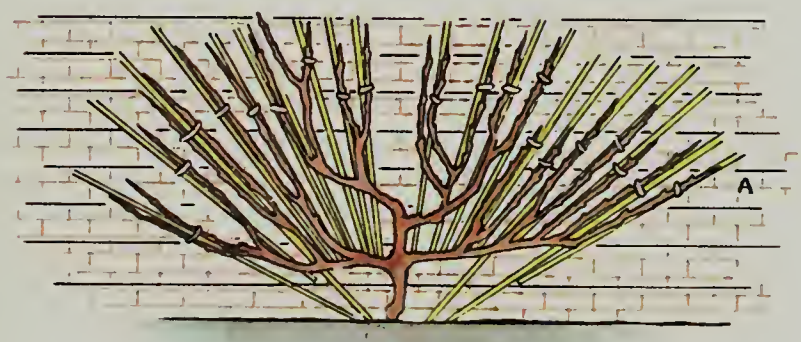
2. Midsummer



3. Following spring

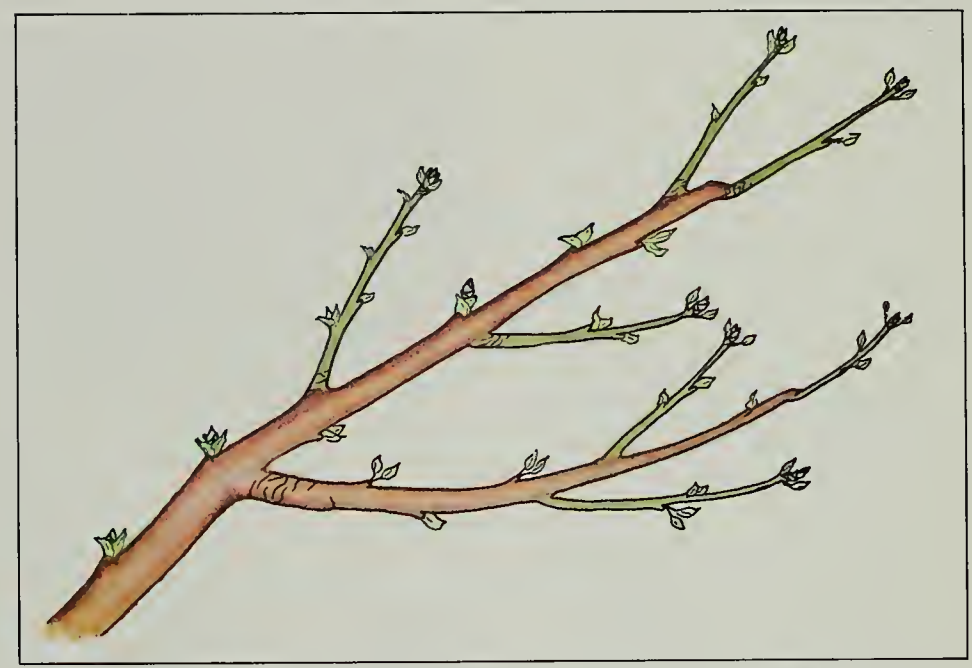


4. Second midsummer



5. Third spring

PRUNING ESTABLISHED FAN-TRAINED MORELLO CHERRIES



Because Morello cherries fruit on two year old wood, prune to encourage growth of new wood, gradually replacing the old. The branch in spring shows greenish wood, last years' growth which will fruit this year. Brown wood is older and bears less fruit, but a certain amount of old wood is necessary, as it forms the framework of the tree.

Pollination

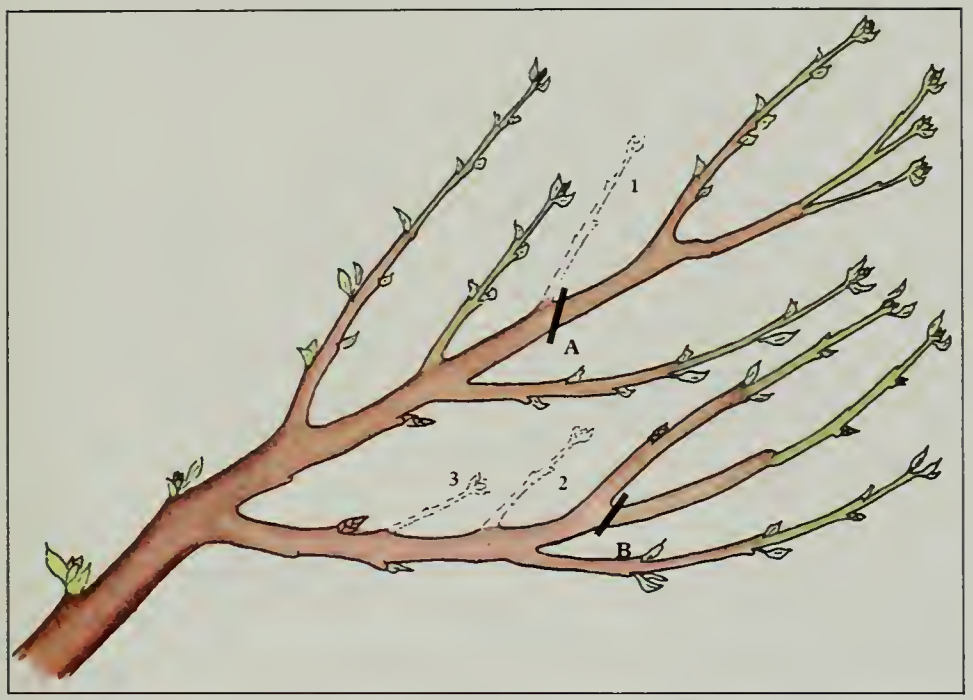
A major factor in the selection of a variety is pollination. Sour cherries are self-fertile and can be planted singly. Morellos will pollinate sweet cherries if they are flowering at the same time. If you do not have a Morello tree, you must select a compatible pollinator for sweet cherries or they will not fruit. There are thirteen pollination groups. One group contains what are known as universal donors, which will pollinate any other variety. Varieties in the remaining twelve groups will only pollinate those of another group. The two varieties you choose must also flower at the same time. Remember that trees grown against a wall or in a very warm situation will flower earlier than those grown in the open, so not only may pollination be affected but the trees may suffer from excessive heat in summer. The very safest method of overcoming pollination problems, if you have the room, is to plant a Morello as an all-purpose pollinator for sweet cherries.

Buying a tree

Whips are one-year-old trees grafted just above soil level, with a number of thin branches coming from a central stem. These are relatively less expensive than older trees, and sour cherry trees of this type can be trained into bush or fan shapes if desired. Sweet cherries are usually bought as standards and grow too tall for such training.

All named varieties of cherry trees are normally budded or grafted onto rootstocks. Trees grafted onto *Prunus avium* are more reliable than those grafted onto *Prunus mahaleb*. Another very good and reliable rootstock is the East Malling Mazzard F12/1. If possible, ask for trees which have virus-resistant rootstocks. These offer some protection against dis-

PRUNING ESTABLISHED FAN-TRAINED MORELLO CHERRIES



This is the same branch one year later. Cut back old wood (A and B) to a convenient bud or sideshoot in early spring, to keep the tree open and to encourage new fruiting shoots to form (1,2,3). These fruit next year.

ease, and the initial extra expense is well worth it.

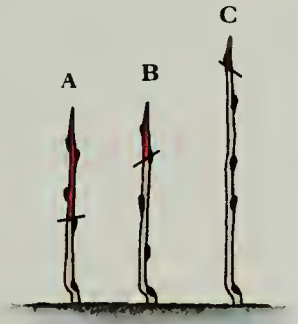
Cherry trees are particularly susceptible to bacterial canker at the base of the branches. A staddle is a special form of grafting designed to overcome this problem. Branches of the named variety are grafted onto the rootstock about 6 ft (1.8 m) from the ground. When they are available, staddle grafted trees are more expensive, but may be worth it for the disease-resistance.

Planting out

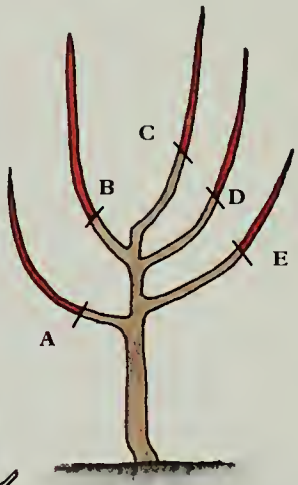
Bare-rooted cherry trees are best planted only in the spring in the North. Where winters are mild, they can be planted in late fall. Container-grown trees may be planted at any time, although it is generally better to plant them while they are dormant. If you buy a bare-rooted tree, and are unable to plant it immediately in its permanent position (perhaps because of bad weather) heel it in until conditions improve. Select a sheltered site, out of strong winds, and dig out a V-shaped trench one spit (spade's depth) deep. One side of the trench should be vertical, the other side sloping at a 45° angle. Lay the plant in at a 45° angle, return the soil and firm it down. This temporary planting will keep the roots moist and protected from frosts and exposure; plant the tree in its permanent position as soon as conditions allow.

Because cherries have a deep rooting system and are liable to suffer in dry summers, deep cultivation of the soil before planting is necessary. Dig to a depth of 3 ft (90 cm). The hole should be large enough to take the root system when fully spread out; never jam or twist a tree to fit into a hole which is too small. Cherries need plenty of lime and potash; if your soil is at all acid, work in ground limestone when planting, so that the soil

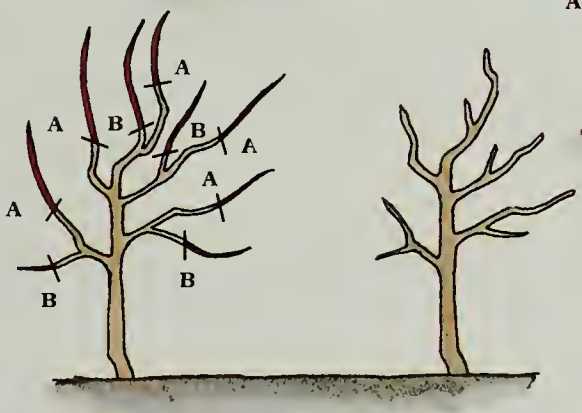
TRAINING STANDARDS, HALF-STANDARDS



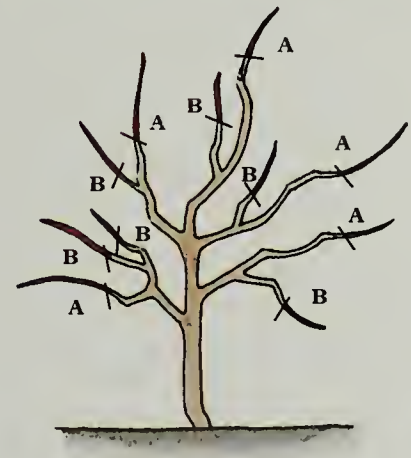
1. Newly planted whips

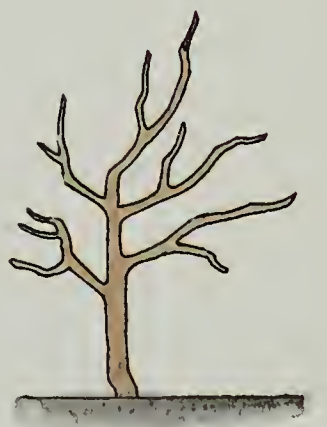


2. The following spring



3. The third spring





4. Established tree

AND BUSH CHERRIES

Training one-year whips (maidens) into standards, half-standards and bush trees is the same process, except for the initial cut which determines the height at which branches form.

1. For a bush tree (1A) cut the whip back to 3 ft (90 cm). For a half-standard (1B) cut back to 4 ft (1.2 m) or less. For a standard (1C) cut back to a convenient height. Rub out any side-shoots so the tree is clear stemmed.

2. Allow the top four or five shoots to develop. The next spring, cut all these shoots back to 9 in (23 cm). Make the cut to just above a bud (ABCDE). New shoots will develop from the pruned branches.

3. The third spring the tree has been in your garden, cut the leading shoots back to 12 in (30 cm) (A) and the laterals (B) back to 6 in (15 cm).

4. Once the tree has a good shape (usually this takes three or four years) spring prune by removing one-third of the last year's growth of each leading shoot (A) and cutting back laterals (B) to 6 in (15 cm). Remove badly placed or crossed laterals, and remove any dead or diseased wood. Prune to keep the crown open so that light and air can circulate.

is just neutral in its reaction. Wood ashes, which are rich in potash, can be dug in at the same time, at 4 oz per sq yd (120 g per sq m).

Before planting the tree, examine its root system carefully. Trim any damaged or dead parts of the roots with sharp shears. Then place the tree in the hole at the same depth as it was planted in the nursery, with the union of the rootstock 3 in (7.5 cm) above the soil. You can tell where this union occurs by a slight swelling, or slightly different colors of the two barks. A soil collar mark indicates the original soil depth.

Hold the tree upright, while you replace the soil, shaking it gently to work the soil around the roots. Replace the soil a little at a time, treading in each layer firmly.

Standards need supporting with stakes. To minimize the risk of bacterial canker infection through the wounds caused by chafing, smooth-surfaced plastic tree-ties or other soft material can be used.

Following planting and watering, dress the soil around the trees with two buckets of rotted manure per tree, as a mulch kept slightly away from the stem. If the soil is very dry or there is a prolonged period of drought after planting, regular watering of the young trees is a good idea, but normally the mulch should suffice.

If you are planting more than one cherry tree, space them according to their ultimate size. Standard cherry trees should be 23–33 ft (7–10 m) apart, 16–23 ft (5–7 m) for dwarf or sour cherries.

General care

If you have to tie in branches to train a fan tree, be sure to use a type of material that does not chafe the bark, so that there is less risk of bacterial canker infection.

Because cherries are deep-rooted, it is not usually necessary to water established trees except in severe droughts. If watering is necessary, thoroughly wet the soil with the sprinkler. Water slowly to give the water a chance to saturate the

ROOT PRUNING TREES

1. Dig a semicircular trench 2–4 ft (60–120 cm) from the trunk, exposing most of the main roots.

2. Tie back the smaller roots and fibrous feeding roots. Saw off thick roots and trim back any damaged ones.

soil beneath and not just dampen the surface. If possible, do not wet the fruit itself at or near harvest time. Fruit splitting also occurs if trees are watered heavily after a prolonged dry period. Remember that trees planted against walls will dry out more quickly than those grown in open ground; water these more frequently if it is necessary.

It is a good idea to mulch around each tree in spring, at the rate of 2 gal (10 L) of well-rotted manure or garden compost per sq yd (sq m). Make sure the soil is moist before mulching; mulching cannot conserve soil moisture if the soil is dry to begin with. In addition, trees will benefit from an annual late winter application of 1 oz per sq yd (30 g per sq m) of a nitrogenous fertilizer, and ½ oz per sq yd (15 g per sq m) of sulfate of potash. Every third year supplement these applications with ⅔ oz per sq yd (20 g per sq m) of superphosphate.

Keep a minimum of 10 sq ft (3 sq m) clear around young sweet cherry trees. When they are well established, they can be grassed over; even then, the grass must be mowed regularly. Be careful not to damage the trunk with the mower; it is best to hoe close to the tree. Leave the mowings to rot and form a mulch. Cherries are very sensitive to some herbicides, so seek reliable advice before using them, or alternatively use a hoe. Sour cherries should always be grown on bare soil, kept free of weeds by hoeing.

Cherry rootstocks sometimes produce suckers which may appear some distance from the trunk. If this happens, cut them off below soil level, where they are attached to the roots, using a sharp knife.

Training and pruning

Fruit trees are initially pruned to form the tree's shape. When the tree has been trained, long-term pruning is done to keep the tree strongly branched and open to light and air; dense trees with overcrowded branches are more likely to become diseased. Long-term pruning is also done to balance the tree's vegetative growth with its fruit production. Prune lightly to avoid winter injury.

There is a major difference in the fruiting habits of sweet and sour cherries which determines the type of pruning carried out once the tree has become established. Sweet cherries produce fruiting spurs on both old and new growth, so there is no need to prune out the old growth to encourage cropping. Sour cherries, however, are pruned to encourage the production of new growth which bears fruit the following year; old, unproductive growth is continually being replaced.

TO CORRECT NONFRUITING

3. Put some soil back into trench; untie and carefully spread out the remaining roots and cover with soil.

A second major difference between sweet and sour cherries is their vigor. Sweet cherries are usually too vigorous in growth to be trained into smaller shapes, while sour cherries can be trained as bushes, fans and other espaliers.

Two general pruning rules apply to both sweet and sour cherries. Never prune the trees in late autumn or winter, because of the risk of silver leaf or bacterial canker infection. Confine pruning to early spring. Secondly, all cuts should be made smooth, just above a selected bud facing in the direction in which you want it to grow. Make sure there are no jagged edges or snags, and paint over any cuts larger than 1½ in (4 cm) with a tree wound paint.

Fan-training sour cherries

You will need a wall or fence 8 ft (2.4 m) high and 20 ft (6 m) wide. If you wish to train the tree against a wall for landscape effect, do not use a wall facing south. The tree and fruit might "cook" in the heat. With ⅛ in (3 mm) gauge wire at a spacing of 6 in (15 cm) apart, wire the wall horizontally. The best form in which to train a cherry is that used for peaches, with the central leader pruned out entirely and the fan built up from two opposite diagonal branches. You must buy a very young tree and fan-train it yourself (see diagram).

Prune in early spring, at bud-break, removing one quarter of all new growth to an upward-pointing bud. This will stimulate the topmost bud and those behind to produce more shoots. Train on the leading shoot; select others growing parallel to the wall and tie them in. As with all fan-trained trees, rub out any shoots growing directly towards or away from the wall.

Maintaining established fans

The sour cherry fruits only on wood which has been made the previous year. In late summer, a mature sour cherry tree will have three types of wood: the nonfruiting fan framework which is the oldest part of the tree, two-year-old sideshoots which have just cropped, and one-year-old sideshoots which will crop the following summer. The tree is pruned on a replacement system, with the two-year-old wood being constantly replaced with new wood (see diagram). Inspect the tree in early spring for any winter dieback; cut out dead or diseased wood to a healthy bud and protect the wounds, if over 1 in (2.5 cm), with tree wound paint. Tie in the young shoots in spring and summer, while they are still flexible. Branches must never overlap; the main framework should radiate out, like the spokes of a wheel; sideshoots can be left as close as 3 in (7.5 cm) apart. Light and air should reach all the wood. If the branches are becoming too crowded, thin them out; the fan should present a neat, flat appearance. When the main framework shoots reach the end of the wall or have filled the space allotted to them, prune them to a bud pointing upward. If fruiting is diminishing, and there is little vegetative growth, prune back the main framework branches by about one third.

Training bushes, half-standards and standards

The main difference between bush, half-standard and standard sour cherries (sweet cherries are large trees and lend

themselves only to standard training) is the height at which the main stem begins to form branches. The training and pruning of all three forms is essentially the same. For a bush form, prune it off at about 3 ft (90 cm) above ground level in early spring, for a half-standard prune it to 4 ft (1.2 m) or less, and for a standard prune it to a convenient height above ground level. Then follow a pruning routine to form a strong, well-branched head (see diagram).

Root pruning

If your established tree is growing much too large, with vigorous vegetative growth, but is cropping very lightly, root pruning is a possible corrective measure. It is best to do this over two winters, digging one semicircle of root area the first winter and the remaining semicircle the next. Dig a semicircular trench 3–4 ft (90–120 cm) away from the trunk. Cut through thick taproots leaving the fine feeding roots and tying them back. Replace the soil, after spreading out the fine roots, treading it down firmly. The next year complete the circle (see diagram).

Harvesting

Sour cherry whips will carry a small crop in their fourth year, while trees bought as standards will probably begin to crop in their third to sixth year (usually the third or fourth year in your garden). Any flowers which form before the tree is fully trained should be removed; they drain the tree of energy which is needed to form a strong healthy framework. Full cropping will not take place until the tree is at least ten years old.

Sour cherries on one tree tend to ripen simultaneously, so only a couple of pickings are necessary. The fruit is ripe when it begins to soften and it is easy to squeeze juice from it. It is best to harvest sour cherries by cutting through the stalk with blunt-nosed scissors. Pulling the fruit can lead to brown rot infection where the stalks are torn from the bark.

If any branches are broken during picking, prune them back immediately and treat with a commercial tree wound dressing or an oil paint.

Sweet cherries do not ripen all at once, and several pickings are necessary, at two or three day intervals. When you remove the fruit, do so carefully and be sure the stalk is still attached.

Split fruit results from rain at harvest time; it is unsightly and very susceptible to rotting. If rain threatens, it is advisable to harvest slightly unripe fruit. Once picked, it is best to eat or preserve the fruit as soon as possible.

Exhibition tips

Your dish of cherries must be of all the same cultivar (cultivated variety), unless the show schedule states otherwise. Fifty is the usual number for exhibition.

For both sweet and sour cherries the judges will look for large, ripe fruit with stalks still attached. Fruits without stalks or with shriveled stalks are not acceptable, nor are small, unripe or overripe fruits, or those which are blemished or splitting. Avoid fruit which is not brightly colored, and be careful not to damage the fruit in packing.

Cherries for exhibition should be slightly larger than average size for the cultivar, although abnormally large fruits may not win prizes.

Preserving

When you have a large crop or wish to set aside sweet cherries for winter eating, they may be preserved by canning or freezing. If you have a large enough freezer, that process is easier and faster. Choose tree-ripened cherries of good color and sweet flavor and prepare them quickly to avoid changes in the choice flavor or color. Remove the stems, and the pits if you wish, wash the whole cherries in cold water and drain. Pack them into containers and cover with a cold syrup of three parts sugar to four parts water to which ½ teaspoon per quart of crystalline ascorbic acid has been added. Leave head space according to container size and shape, seal, label with contents and date and freeze at 0°F (−17.77°C) or lower.

Varieties

There are many more named varieties available than those listed; check with your local nursery or garden center to find out which varieties are most suited to your particular area. Keep in mind that fruiting periods vary with climate and local conditions, even to the extent of changing the seasons given below.

Make sure if you buy a sweet (dessert) cherry that you have another suitable cherry tree to provide cross-pollination. A Morello cherry is generally considered to be the most reliable cross-pollinator for sweet cherries; its smaller size is an added advantage for a garden which only has room for one large cherry tree. Morello cherries are self-fertile; a single tree will produce fruit. All sour cherry varieties are self-fertile and many are prized for making pies and preserves.

Sweet cherries

Bing: large, red, heart-shaped; use fresh, frozen or in preserves. Midseason to late.

Black Tartarian: a fine-flavored eating sort, good for canning and jams; vigorous and prolific. Fruits heart-shaped and nearly black. Early.

Emperor Francis: yellow fruits resembling Napoleon but firmer and more meaty; well-flavored. Early.

▲ *Napoleon or Royal Anne*

Donald Smith

▲ *Schmidt's Bigarreau*

Hedelfinger: a good black but less well known and later than Black Tartarian. Midseason.

Kansas Sweet: large, dark red and firm; good for eating, freezing, preserving. Late; particularly suited to Midwest and south to Texas.

Lambert: dark red, large-fruited; a favorite in some areas. For eating, canning, etc. Midseason to late.

Late Duke: a cross between sweet and sour cherries; dark with dark flesh. Suitable for both eating and cooking but not quite equal to either group.

May Duke: similar to Late Duke but very early.

Napoleon or Royal Anne: yellow with a red cheek; firm, juicy and sweet, a good canner. Vigorous prolific and early. Will not bear fruit if grown alone.

Schmidt's Bigarreau: deep mahogany and extra large; flesh dark, tender, with pleasing flavor. Vigorous and very productive; midseason to late.

Stark Gold: yellow, a good producer of attractive, delicious fruits. Midseason to late.

Starking Hardy Giant: a large, vigorous tree producing many large, bright red fruits. Midseason.

North Star: a cross between the hardy Siberian cherry and Morello, it is self-

Donald Smith

▲ *Late Duke*

Donald Smith

▲ *Emperor Francis*

Bernard Alfieri

▲ *Morello*

fruitful, prolific and very hardy. Fruit is a bright red, large and of good flavor. Naturally dwarf, it grows to 6–7 ft (2 m); late.

Van Sweet: a good red but not as well known as most. Midseason to late cropper.

Windsor: one of best quality dark red cherries for eating fresh or canning. A rapid and upright grower; late.

Yellow Glass: perhaps the hardiest yellow; large, sweet, well-colored. Good for eating fresh, freezing, canning, preserves; late.

Sour cherries

Early Richmond: a good pie cherry, red, hardy and productive.

Montmammoth: large, red-fruited; heavy bearing. Early to midseason.

Montmorency: the best-known sour cherry for pies and preserves; red-fleshed, tasty. Regular bearer of heavy crops. Self-fruitful; early to midseason.

Morello: more common abroad than in the United States; used for pies, tarts, jams and brandied cherries. Red, prolific, self-fruitful and a good pollinator for other cherries.

Suda Hardy: less well known but good. Hardy, good bearer, red; midseason to late.

Pests & Diseases

Cherry trees are subject to attack from insects, diseases and birds. Birds are obvious and most insects can be seen, but the wise gardener will learn to recognize the diseases as well and thus be able to apply effective controls.

Birds: sweet cherries are particularly susceptible to attack by birds, and sour cherries are only slightly less susceptible. Robins, orioles, catbirds, starlings and other birds eat the ripening fruit, and spoil others with their droppings. Although draping trees with black cotton and commercial bird scares are moderately successful, the best method is to net the tree whenever possible or to apply acrylic webbing.

Cherry black aphid: this insect attacks the buds and blossoms as well as the tips of young shoots where it sucks the juices, often causing stunting and twisting. Further, it exudes a sticky substance, called honeydew, in which a black sooty fungus grows. Spray with a superior oil when the blossom buds are beginning to open.

Cherry/plum curculio: deposits eggs in developing fruits. The result is wormy cherries. As the last petals are falling, apply the same combination spray recommended by your state university extension service for apples.

Murphy Chemicals Ltd.

The small caterpillars of the fruit moth feed on the blossoms and fruitlets.

Donald Smith

Cherry black aphids feed on the tips of young shoots and cause distorted fruitlets.

European red mite: minute spiderlike creatures which suck the plant juices. Control them with the oil spray recommended above for aphids.

Scales: various flat scalelike insects also attack cherries but are readily controlled by the oil spraying mentioned above.

Powdery mildew: causes a powdery white coating on the leaves and buds, in serious cases distorting the former. Apply a mildew control recommended by your local state authorities or depend upon the combination apple spray.

Black knot: this disease attacks sour cherries primarily causing abnormal branching and "witch's brooms." Remove all such diseased parts, cutting well below the injured areas.

Tent and other caterpillars: butterfly and moth larvae that feed on leaves. Readily controlled by applying the combination apple spray as needed.

Brown rot: this fungus disease can destroy ripe and half-ripe fruit, leaving much of the crop inedible. It is encouraged by wet spring weather and appears as brown rot on the fruit, in which concentric rings of small white or yellow pustules show. These pustules contain the spores, which will spread and infect other fruit, usually entering through a hole in the skin made by birds or insects. Infected fruit will either drop off the tree, or shrivel up and remain on the tree. These mummified fruits, if allowed to remain for the winter on the tree or ground, will reinfect new fruits the following spring.

GUIDE TO CHERRY TROUBLES

Symptom	*Probable cause*
Blossom and developing fruitlets eaten	Oriental fruit moth
Tips of young shoots covered with tiny black insects, shoots stunted, leaves curled and twisted, small, distorted fruit	Cherry black aphid
Fruit worm	Curculio
Leaves bronzed, premature leaf fall	Red spider mite
White coating on leaves	Powdery mildew
Swellings on roots, or occasionally on stems	Crown gall
Leaves with holes eaten into them	Caterpillars
Fruit turns brown, with rings of yellow-gray or white pustules; fruits eventually shrivel up	Brown rot

Donald Smith

▲ *Bacteria can cause oozing lesions on the branches and trunks of fruit trees.*

Ministry of Agriculture

▲ *The effects of brown rot, a fungal disease which destroys ripe and half-ripe fruit.*

Chicory

Cichorium intybus (fam. *Compositae*)
Perennial, grown as an **annual**
Sowing to harvesting time: 12–16 weeks from sowing to lifting the roots. which are then stored and forced at intervals during winter and spring
Size: leaves grow to a height of 10–12 in (25–30 cm) in the first year, when harvested green; chicons (blanched shoots) 5–9 in (12.5–22.5 cm) long
Yield: 12–15 plants per 10 ft (3 m) row; each yielding 4 oz (125 g)

A fresh, crispy vegetable harvested in winter and early spring, chicory is becoming increasingly popular as an unusual, easy-to-grow, and delicious crop. Its blanched creamy white, tightly packed shoots, called *chicons,* are a real delicacy, and are available to the home grower for very little outlay in time or money. Occasionally, you can buy this vegetable from certain food shops, but it is quite expensive. However, if you grow chicory, for the cost of a packet of seeds you can have heavy crops of fat chicons over a period of several months, at a time of the year when fresh vegetables are especially appreciated.

Although it is most widely known for its blanched chicons, chicory is harvested in a variety of ways, from summer onwards. At first, its unblanched green leaves, which resemble those of a dandelion, are picked and either used fresh in salads or cooked and eaten like spinach. In autumn the roots are lifted and stored for forcing chicons through the winter. Lastly, the roots of some varieties can be cut up, roasted, and ground for use as a coffee substitute, or blended with coffee to give a pleasantly bitter taste to the drink. In these days, wth coffee so expensive, growing crops of chicory root for this purpose can be a real money-saver. Usually varieties which are grown for their roots have less tasty leaves than those grown for chicons, but there is one variety, Magdeburgh, which can be used both as a vegetable and as a coffee substitute.

Sugarhat chicory is another, and quite distinct, variety. In autumn it produces a very close head of inwardly curled leaves, a bit like a Chinese cabbage or pale cos lettuce in appearance. Because it can stand a moderate degree of frost, it is a valuable asset to the winter vegetable garden. It makes a very pleasant salad at a time when lettuce has to either be grown in artificially heated conditions or bought from markets at top winter prices.

The chicory plant is a hardy perennial, and its bright blue, daisylike flowers can often be seen in the countryside, particularly on poor soils. Do not, however, dig

up wild chicory and attempt to blanch it or use the roots for essence of chicory; it is a poor substitute for a named variety, and is bound to give disappointing results.

Many people are put off by the fact that blanching is necessary before chicons can be produced. This is not at all difficult, and can be done in very little space. A bit of room in an airing cupboard, attic or warm cellar is all you need. Alternatively, under the greenhouse benches is another out-of-the-way place which can be put to good use. Once the roots have been prepared and packed into boxes or pots (both very simple operations), there is nothing left to do but harvest the chicons a few weeks later.

Suitable site and soil

An open site with not too much shade is ideal; make sure it is well away from overhanging trees. The best soil for growing chicory is a light but reasonably fertile one, which is at least 2 ft (60 cm) deep. Avoid badly drained soils, and shallow or stony ones. During the autumn before sowing the following spring, double dig the soil, working in plenty of well-rotted manure or garden compost so that it is completely absorbed during winter. Soil which has been manured for a previous crop will only need light forking over before planting.

Chicory is found growing wild on poor soils, and prefers a limy soil. If your soil is acid, work in limestone a week or two before sowing; the rate will depend on the pH of your soil.

Sowing

Dormant chicory roots are not widely available commercially, so you will probably have to raise plants from seed. This is not at all difficult, if you wait until late spring before sowing. Seeds sown earlier than this will form very big roots by the time they are lifted the following autumn or winter. These large roots are more liable to bolt (go to seed) without producing chicons. If they do not bolt, they tend to form several small

Step-by-step Growing Guide for Chicory

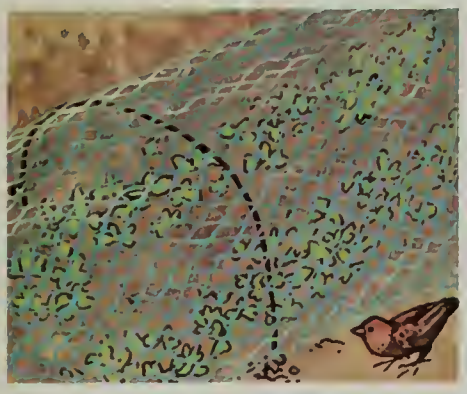
SOWING AND THINNING

1. In the autumn before sowing, double-dig the soil; work in plenty of well-rotted manure or compost.

2. In late spring, sow seeds thinly, in drills ½ in (1.3 cm) deep, and 12–18 in (30–45 cm) apart.

3. As soon as the seedlings are large enough to handle, thin them to 9–10 in (22.5–25 cm) apart.

CULTIVATION AND CARE



1. Birds find seedlings of Sugarhat chicory attractive; protect seed rows with netting if necessary.

2. Chicory is deep-rooted, so water the growing plants only if there is a severe drought.

3. Mulch with clean dry straw in midsummer to keep weeds down and also conserve soil moisture.

4. Occasionally, plants will attempt to flower; if this happens, cut out flowering stems at ground level.

5. In summer, pick a few leaves from several plants for use cooked as a spinach substitute or fresh in salad.

chicons instead of single, large, tight ones.

Before sowing, rake the soil surface to a fine tilth. Make the drills ½ in (1.3 cm) deep, and 12–15 in (30–37.5 cm) apart. If the soil is dry, flood the drills a couple of times with plenty of water. Sow the seeds thinly and firm the soil over the drills afterwards. As soon as the seedlings are large enough to handle, thin them 9–10 in (22.5–25 cm) apart. As with most taproot vegetables, thinnings do not transplant well and they are best put on the compost heap.

Varieties such as Sugarhat which are grown for unblanched salading should

Marshall Cavendish Jerry Tubby

A bed of well-grown chicory in summer. The unblanched leaves are the first crop taken from chicory, before roots are lifted for forcing in autumn. Avoid stripping all the leaves off a single plant; either reserve plants especially for this purpose, or pick only one or two leaves from each plant.

Chicory flowers are bright blue and daisylike, but it is unlikely you will see them, unless you are allowing your plants to set seed.

be started later in the season, say through early and midsummer, so they will be ready when there is little lettuce to be had, in late autumn and early winter. Otherwise the sowing procedure is the same as above.

Cultivation

Very little is needed in the way of cultivation as chicory is a tough, strong grower and can look after itself. Because it is deep-rooting, watering is unnecessary except in severe droughts. If the soil has been well manured beforehand, no additional feeding should be necessary either. Vigorous growth will smother many of the smaller weeds, but hoe if

Harry Smith

PREPARATION FOR FORCING

1. Lift the roots from early autumn onwards; only keep those with a crown diameter of 1–2 in (2.5–5 cm).

2. For storing in boxes, trim back foliage to within 1 in (2.5 cm) of crown and remove all side roots.

3. Pack roots horizontally in boxes containing moist sand, and store in a frost-free shed or cellar.

weeds become a problem. Alternatively, mulch with clean, dry straw in midsummer, to keep weeds down.

You may find the occasional plant attempting to flower. If this happens, cut out the flowering stems at ground level.

The Sugarhat variety is sometimes troubled in the seedling stages by attack from birds, and some netting may be necessary. Once the plants get going, the birds find them less attractive and they are usually left alone.

Unblanched salading

A bonus crop may be taken from some varieties by cooking the leaves like spinach, or using them fresh as green salading. During the summer, either take a few leaves from a number of plants in order not to weaken any one of them, or reserve certain plants for this purpose.

Sugarhat chicory will form tightly packed white hearts in autumn, and may be cut for salad as required. Cut off the heart with a sharp knife. Alternatively, pull up the plant and trim it afterwards. The roots can be put on the compost heap, as this variety does not blanch as well.

Preparation for forcing

Chicory roots are normally lifted in autumn and either stored in boxes indoors, or heeled in the ground until they are needed for forcing. Forcing can begin in early autumn for chicons before the holiday season and can continue through late winter. Some people leave the roots in the soil, undisturbed, until needed, but in mild weather the roots may begin sprouting prematurely. In cold climates they may be frozen in, unless mulched heavily.

When lifting, remember that the quality of the chicons produced is directly related to the quality of the roots. Select only strong-growing, healthy roots and consign the rest to the compost heap. Roots with a crown diameter of 1–2 in (2.5–5 cm) are best. Any roots you leave in the soil will complete their perennial life cycle and produce flowering stems the following spring. This is only useful

Brian Furner

These healthy, strong-growing roots have been lifted for forcing. Roots with a crown diameter of less than 1 in (2.5 cm) tend to produce poor chicons. Those with a crown diameter larger than 2 in (5 cm), on the other hand, may produce several small chicons instead of one large one.

if you plan to save seed; otherwise, clear the site completely of all chicory roots so it can be used for another crop.

If you are heeling in the roots, lift them from early to late autumn. Pack them tightly into a deep trench, and cover the plants with enough soil and leaves or clean straw to keep the frost off. You need not trim the roots or foliage at this stage, and heeling in should be a fairly quick operation. Dig up a few roots at a time, as you need them, from midautumn through early spring. Cut off the foliage to within 1 in (2.5 cm) of the crown. Leave them in a frostproof shed for a week or so, to allow them to dry out. Then trim the root back to 8 in (20 cm) and cut off all side roots with a sharp knife, to prepare them finally for forcing.

If you have nowhere in your garden to heel the plants in, store them in boxes. Lift and select the roots as for heeling in; late autumn is the best time to do this. Prepare them completely by trimming back the foliage and removing all side-shoots. Pack the roots horizontally in boxes containing moist sand; the moisture prevents them drying out. They can be packed quite close together. Store the boxes in a cool, dry place. Temperature

FORCING

1. A month before the chicons are needed, fill pots with damp sand, moist peat, potting mixture or soil.

2. Put the prepared roots in vertically, 2–3 in (5–7.5 cm) apart, so that crowns are 1 in (2.5 cm) below soil surface.

3. Invert another pot over the roots to keep the light out; remember to plug the drainage hole with a cork.

4. Begin inspecting pots a month later; the chicons are ready for harvesting when 5 in (12.5 cm) tall.

5. Pull up the root and cut off the chicon afterwards; cut as close to the crown as possible.

is most important during storage, because if it is too warm the roots may start producing shoots. On the other hand, if it is frosty the roots may be killed; ideally, the temperature should be a couple of degrees above freezing.

Forcing

About a month before the first chicons are required for the table, take out as many roots as you need; each root normally produces one chicon. For a continuous supply, lift a few roots every week or two. Lifting all your roots at once will lead to a glut of chicory; as it does not keep particularly well, successional forcing is a far better practice.

Marshall Cavendish Mark Lawrence

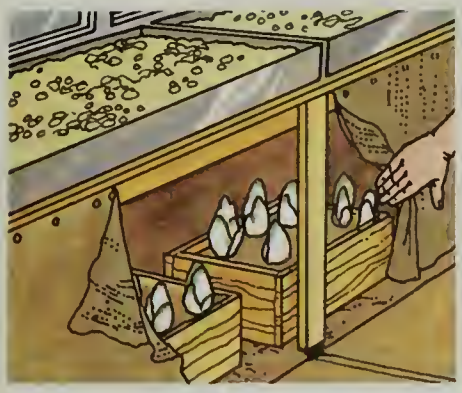
The process of forcing chicons is a simple one, and one which requires very little space.

Any container which is reasonably lightproof will do, provided it is deep enough to take the roots comfortably. You can use barrels, large flowerpots, black plastic bags or wooden boxes. Fill them part way up with damp sand, moist peat, potting compost or light soil. Then put the roots in vertically, 2–3 in (5–7.5 cm) apart, and fill up the container with the remaining compost until the crowns are about 1 in (2.5 cm) below the surface.

The problem of excluding light can be solved in three ways. The containers can be placed in an absolutely dark room or shed, in which case they will not need covering. Alternatively, cover the containers with boxes, black plastic, sacking, or inverted pots to keep the light out, remembering to allow sufficient headroom for the developing chicons. Lastly, you can cover the crowns with about 7 in (17.5 cm) of additional peat, sand or potting soil. Although it is a more tedious method, chicons which are forced through soil or other material tend to have more tightly packed heads than those growing without covering.

You can also force chicons in the soil under the greenhouse benches. Use a dibber to make holes 2 in (5 cm) apart. Fill the holes with water, and when it has drained away, put the roots in. Exclude

ALTERNATIVE FORCING METHODS



1. Chicons can be forced in boxes under greenhouse benches; keep out light with black polyethylene sheeting.

2. You can expose the crown and cut the chicon off in place; the root may then produce a second, smaller crop.

light either by draping black plastic from the benches to the floor of the greenhouse, or by earthing up. Use 9 in (22.5 cm) boards along the edge of the border to form a temporary retaining wall. Cover the planted roots with 7 in (17.5 cm) of suitable material, and sprinkle it lightly with water.

The roots need a minimum temperature of 50°F (10°C) to start producing shoots. If the surface of the sand or soil mix looks bone dry any time during forcing, sprinkle it lightly with warm water, but be careful not to overwater.

Polyethylene bags can be used for forcing, but make sure there is enough room for the chicons to develop.

Depending on the heat, chicons should be ready for cutting from a month to six weeks after the roots have been planted. Begin inspecting the containers or greenhouse border after a month. Chicons are best when about 6–8 in (15–20 cm) long; those forced without earthing up will be about 5 in (12.5 cm) above the soil. The spearlike tops of those being forced under sand or soil mix will be slightly below the surface; a small mound of disturbed soil will appear directly above them. This mound indicates that the chicons are ready for pulling and it is pointless to leave them longer.

To harvest, pull up the root and cut off the chicon afterwards. The aim is to get a complete chicon, not one that disintegrates into separate leaves as soon as it is touched, so cut as close to the crown as possible.

A second, smaller crop of chicons may sometimes be taken by replacing the roots in the same container after cutting, but you will get far better results if you use fresh roots.

Exhibition tips

Blanched chicory is not often seen at major shows because there are few taking place when chicory is at its best, in winter and early spring. Twelve is a

common number of chicons required for collections, and nine for single dishes.

There are no special cultivation requirements for growing exhibition chicory. Proper packing and presentation is all-important though and, if badly presented, valuable show points can be lost. As close to the show time as possible, cut the heads with a sharp knife. Make sure there is a tiny bit of root attached, so the leaves hold together. Wipe away any soil or sand adhering to the outer leaves with a damp cloth. Roll the heads up, individually, in tissue paper, and lay them side by side in a shallow box. Exposure to light will cause the leaves to lose their blanch and turn green, so keep them covered until the last possible moment. Once they are on the staging, cover the chicons with brown paper until the judges appear.

Points will be awarded for long, solid, crisp chicons, which are well blanched and uniform in size and shape.

Unblanched chicory can be shown as part of a collection of "salading," which is made up of three or four vegetables normally served cold. The chicory should be fresh, crisp, and perfectly clean, and displayed with the other vegetables in a shallow bowl or plate.

When shown alone, chicory looks best upright on a small spiked board. The surface of the board can be easily concealed with sprigs of fresh parsley after the chicons have been fixed into position. Remember, though, it is the chicory and not the parsley that is being shown, so use the parsley sparingly.

Pests & Diseases

Slugs: chicory is singularly free from pests and diseases, and slugs are the only problem you are likely to encounter. These will attack chicory both above and below ground, feeding chiefly after dark. During the day they hide away in leaf litter, piles of debris, or anywhere where it is dark and moist. They are particularly prevalent on heavy, sour soils, or alkaline soils which are rich in humus and moisture. Sprinkling substances, such as powdered coke, fine coal cinders or a mixture of lime and coal soot, around seedlings and plants has been found effective in keeping slugs away from them.

The main signs of slug infestation are irregular holes in the leaves and roots, and faint, silvery slime trails nearby. Any poison put out for slugs must be repeated on several consecutive nights to be fully successful. Use baits according to manufacturer's instructions.

Alternatively, trap the slugs in bits of decaying vegetable matter or wet sacks placed along the rows of chicory. Inspect the trails daily and remove and destroy all captured slugs. Other traps can be set up using orange skin halves—held up slightly for slug entry with a small stone under one edge. The shade, moisture and shelter they provide attract the slugs. Dressing the soil fairly heavily with lime is another way of killing slugs, provided it is done when they are on top of the soil. Near to dusk is the best time.

▲ *Holes in leaves and faint silvery slime trails are signs of snail and slug infestation.*

Varieties

Cicoria Catalogna: leaves dark green, deeply notched; 12 in (30 cm) long and 3 in (7.5 cm) wide. Vigorous, asparagus type; use both leaves and stalks in spring.
Cicoria San Pasquale: compact, vigorous, productive; leaves broader, cut more, and lighter green than above.

Magdeburgh: 15 in (37.5 cm) tall; leaves medium green, tender, dandelionlike. Use for salads, cooked like spinach, roots as coffee adjunct or substitute.
Rossa de Verona: leaf bronze; sparkling, bitter flavor. Adds sharpness to salads.
Sugarhat: oval heads resembling cos; outer leaves green, inner almost creamy. Used in salads and cooked. Stands heat, fall frosts.

Other varieties:
Sugar Loaf (Pain de Sucre): similar to a well-grown romaine lettuce in appearance; used abroad for winter salads.
Normato: a self-folding Dutch variety; excellent for early forcing.

Bernard Alfieri

▲ *Rossa de Verona*

➤*Chicory can be harvested in three ways. Although primarily used for forced chicons, the unblanched leaves produced in summer are good for salads, and the roots when roasted and ground can be added to coffee, or used as a coffee substitute.*

Bernard Alfieri

A-Z Collection

▲ *Sugarhat*

Thompson and Morgan

▲ *Witloof Chicory*

growing ideas

Chives for Choice Salads

The most delicately flavored member of the onion family, chives have an astonishing ability to quickly grow again after being cut.

Unlike other members of the onion family, chives (*Allium schoenoprasum*) are grown for their grasslike foliage, rather than for their bulbs. The hollow green leaves have a delicious onionlike flavor which enhances all sorts of dishes. Use fresh chives in salads, or chop up the leaves and add them to soups, egg dishes and stews or mix them with soft cheeses.

Chives grow wild in many places in the northern hemisphere. The plants are tolerant of most soils and conditions, and they will grow all the year round.

There are two basic varieties of

Harry Smith Collection

chives—common and Chinese. The Chinese variety dates back about 5000 years, and is still a popular flavoring in Chinese cookery. As the name indicates, common chives are by far the most common sort, although cultivation for both types is exactly the same. There are also several so-called "giant" varieties, but these are grown mostly for ornamental value. Most seed dealers offer only common chives, although one or two do have the Chinese variety available if you would like to try it.

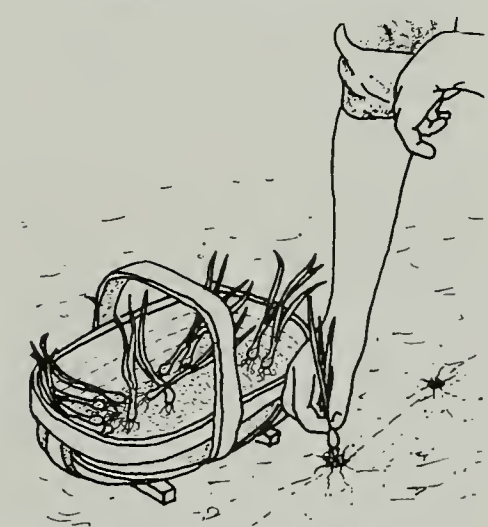
All chives make very attractive plants with their pinkish-purple flowerheads. They make a lovely edging for the herb garden or a border for the vegetable plot. The plants vary in height, usually between 6–18 in (15–45 cm). If you are growing chives for the kitchen, however, choose the smaller varieties because these have the best flavor.

The pinkish-purple flowers make chives one of the loveliest plants in the herb garden.

Chives will grow in most positions in the garden, but the best site is a warm border with partial shade. Encourage profuse leaf growth by providing a site of medium loam enriched with leafmold or well-rotted manure, although any moist soil will do.

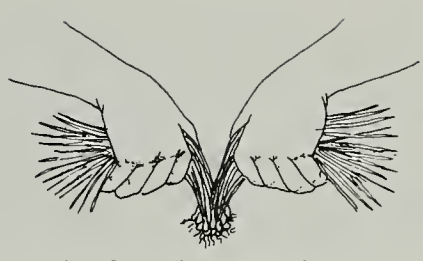
The plants can be started from seed or from bulbs. Sow seed in the open ground from early to late spring. The seed should be sown thinly in narrow drills where the plants are to remain. When the seedlings appear, thin to a spacing of about 6 in (15 cm) apart. You can transplant the stronger seedlings to another bed, or put them into pots to grow on the kitchen windowsill.

You can buy bulbs or established plants for chives from most local seed dealers or nurseries. These, too, are planted throughout the spring. Press the bulbs firmly into the ground about 9 in (23 cm) apart, with the tips level with the soil surface. The bulbs establish themselves quickly and grow into clumps, each having a large number of bulbs at the base.



planting out chive bulbs

All chives grow in clumps, and they can be propagated by separating these clumps. Lift them up with a spade and



separating clumps for propagation

separate the clumps carefully by pulling them apart with your hands. Replant them, either in the spring or just after flowering. Clumps which are divided, replanted and kept well watered after flowering will provide a good supply of young leaves for your salads well into late summer.

A very simple plant to grow, chives require virtually no care. Just keep them well watered and they will grow. Providing that the soil is fairly humus-rich and the plants are not overcrowded, there are no pests and diseases which attack chives. In less than ideal conditions, onion fly could be a problem, so it is a good idea not to grow chives too near your onion or leek beds.

Although the chive flowers are lovely, their development can hinder the production of useful leaves, so if you have only one or two chive plants, or are growing in a pot, you should remove most of the flowerheads before they open. If you want to save your own seed, set aside a few plants and allow these to flower and go to seed. Dry the seed carefully and store it in an airtight jar until needed.

Cut the foliage with scissors as needed, but always leave a bit of "grass" growing above the ground. You can cut chives back every few days in the summer, and they will grow again with more leaves for cutting in a short time. The leaves are best when used fresh; chives can be dried by hanging them in a dry airy place, but it is not really worth it as they lose much of their flavor.

Chives are hardy perennial plants, and

cutting chives for the kitchen

they are evergreen in mild climates, but in less mild winters the plants may die back completely. Growth usually begins again in early spring, or sometimes earlier if the days are sunny in mid to late winter. If you cover chives with glass before autumn frosts, you may be able to cut chives throughout much of the autumn and winter. In any case, it is a good idea to replant the chive beds every four or five years, as chives older than this tend not to crop very well.

Alternatively, for winter use, you could pot up some chive plants into 4 in

chives are ideal for growing in pots

(10 cm) pots filled with a good quality potting mixture and keep them on a sunny windowsill. They are one of the easiest herbs for indoor growing; just keep them well watered and cut them frequently. Obviously, the giant varieties are not the best choice for container growing.

step-by-step growing guide

Sweet Corn

Zea mays (fam. *Gramineae*)
Half-hardy annual
Sowing to harvesting time: 7–13 weeks
Size: plants grow to about 4–12 ft (1.2–3.6 m) or more; ears are 6–8 in (15–20 cm) long
Yield: 1–3 ears (cobs) per plant

The plump kernels of sweet corn, one of the most delicious of garden vegetables, reach perfection only in favorable summers when there is plenty of hot, sunny weather. Once past the seedling stage, though, the cultivation requirements are few, and many new hybrid varieties have been developed to withstand the rigors of the short and unpredictable summers of temperate climates. Sweet corn is highly nutritious, and "corn on the cob" is a favorite summer vegetable. Once you accept that this vegetable is more at the mercy of the weather than most other vegetables, it is well worth a try, and in good summers you will be amply rewarded for your efforts. In a mild year, harvesting can begin in midsummer and extend well into autumn.

There is a certain satisfaction to be had from picking your own sweet corn, and it tastes far better when freshly picked from your own garden than when store-bought. There is a chemical reason for this: the kernels contain a high sugar content, which rapidly changes to starch once the ear is severed from the parent plant. Corn that has spent a fair amount of time in transit from farm to store, or lying on the store counter, will taste stale and bland.

Botanically, sweet corn is a member of the grass family, and the kernels you eat are the seeds, which are formed into tight rows on cobs. Unlike all other vegetables, sweet corn does its growing in darkness, rather than daylight. In its original habitat, subtropical America, days and nights are of equal duration; the long hours of daylight and short nights in northern summers make it difficult for the plant to grow quickly and produce its ears before the weather turns cold in autumn. This is why early sowing under glass is so useful; by giving the plants a head start and planting them out when the weather is warm enough, they will be able to get the full benefit of summer warmth and the grains should ripen in good time. More than any other vegetable, growing corn is a race against the advent of cool autumn weather.

Although the corn you eat is usually pale yellow, almost cream-colored, or sometimes deep yellow, there are other varieties, which are used for animal

feeds or decorative plants, with red, purple, or nearly black kernels. The plant itself is very attractive, and is sometimes grown in flower beds as an ornamental feature.

Suitable site and soil

Sweet corn revels in sun, so an open, sunny site is best. Because it is a tall plant with a shallow root system, it is vulnerable to winds and should be given some shelter in very windy places. Remember that fully grown sweet corn can easily overshadow smaller plants, so consider its siting carefully.

Sweet corn will grow in almost any type of soil but prefers a light, sandy and reasonably fertile one. Ideally it should be grown on a site manured for a previous crop, as too much fresh manure will lead to luxurious foliage rather than good ears of corn. If the soil has not been manured for a previous crop, it is best to dig in compost. If you are dealing with a clay soil, do this as early as possible so that it is thoroughly absorbed. If, however, it is sandy, gravelly or generally well drained, it will be better done later as such soils "digest" organic matter very rapidly. The ideal soil pH is 6.5 so correct excessive acidity or alkalinity at some time before sowing. A week or so before sowing or planting, work in a complete fertilizer at the rate of about 4 oz per sq yd (120 g per m), depending on your soil type. If it is very light you can give a sprinkling of bone meal as well, in order to provide a long-lasting supply of nutrients.

Sowing and planting out

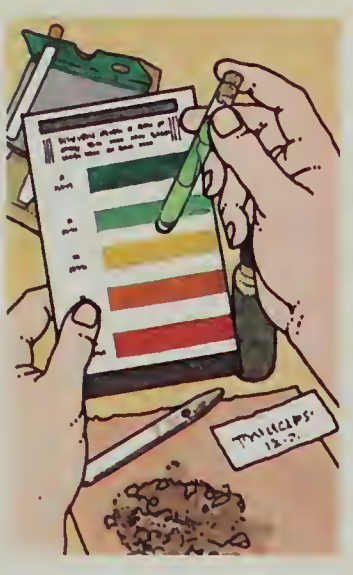
Seeds of sweet corn can be sown outdoors directly into the permanent bed, or started in peat pots under glass and then transplanted in late spring or early summer. Direct sowing is easier, as it eliminates the bother of planting out. On the other hand, it is only suitable in mild,

A bed of well grown sweet corn in flower; mature plants will smother most weeds.

Marshall Cavendish/Clay Perry

SOIL PREPARATION

1. If the soil has not been manured for a previous crop, dig in plenty of compost. Do this early for a heavy clay soil; for light, sandy soils, wait until later.



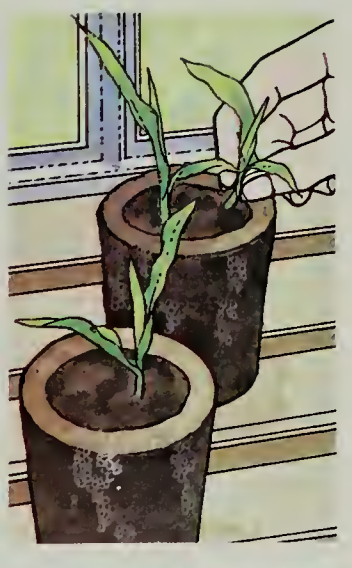
2. Test the pH of your soil with a soil-testing kit. Correct excessive acidity or alkalinity; the ideal pH is 6.5.

3. A week before sowing or transplanting, work in a complete fertilizer.

sheltered areas, and even then, a sudden cold spell can end your hopes of a good sweet corn harvest.

Before the development of peat pots, sowing sweet corn indoors was decidedly risky, and a large percentage failed. This is because the roots resent disturbance, and in transferring them from clay or plastic pots to the ground, the roots inevitably suffered. Peat pots can be planted directly into the soil, so the problem of root disturbance is eliminated.

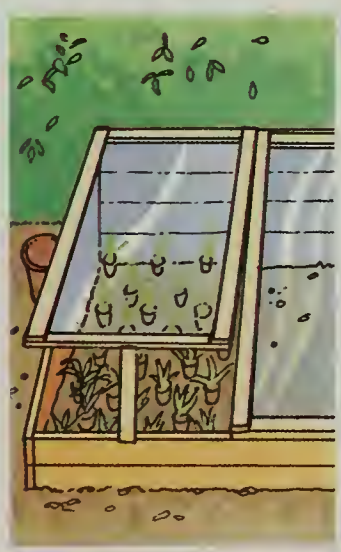
For indoor sowing in midspring, use 3 in (7.5 cm) diameter peat pots, filled with a good quality seed mixture. Put in three seeds per pot, about ¾ in (1.8 cm) deep, moisten the potting soil and cover the pots with a sheet of black plastic, or glass and brown paper, until germination has taken place. The temperature needed for successful germination is from 50–95°F (10–35°C), and preferably above 60°F (16°C). Provided the temperature is high enough, and the soil mix is not allowed



SOWING AND TRANSPLANTING

1. Sow in 3 in (7.5 cm) diameter peat pots in early spring. Put in three seeds per pot, about ¾ in (1.8 cm) deep.

2. As soon as the seedlings are large enough to handle, remove all but the strongest in each pot.



3. In midspring, place the pots in a cold frame, to harden off the young plants.

4. Transplant outdoors when all danger of frost is past. If the soil is dry, dig a hole for each plant and flood it with water before planting out the corn.

to dry out, germination should take place within six to twelve days after sowing. As soon as the seedlings are large enough to handle, remove all but the strongest from each pot. Unless it is unseasonably cold, place the pots in a cold frame to harden the young plants off. Lift the glass on warm sunny days, replacing it at night or if the weather turns cold.

Transplant them outdoors when the likelihood of frost is past. If the soil is dry, dig a hole for each plant and flood with water before placing the peat pot in the hole. It is a good idea to immerse the peat pot in lukewarm water for a few seconds at this time, to aid in the disintegration of the pot once it is in the soil. Make sure the level of the soil inside the pot is the same as the surrounding soil; if it is too high, the soil in the pot will rapidly dry out, killing the roots, and if it is too low, water may collect in the pot, rather like a sump. Plant the corn either

OUTDOOR SOWING

1. Warm soil up by putting plastic covers on soil two weeks before sowing date.

2. Sow seeds in 1 in (2.5 cm) deep drills, at the rate of five or six seeds per 1 ft (30 cm) run.

in rows about 14–18 in (35–45 cm) apart, with 2–3 ft (60–90 cm) between rows, or in blocks, having two or more short rows, rather than one long one.

By giving tunnel protection, you can sow outdoors in midspring; otherwise, wait until late spring or early summer, depending on the weather. It is a good idea to warm the soil up by putting the plastic tunnels on about two weeks before you intend to sow. Sowing under tunnels also protects the seeds from attacks by crows. Remove the coverings in early summer. If you are not giving this type of protection and are bothered with crows, string black cotton thread over and across the rows about 1 ft (30 cm) above the soil.

To sow, draw out drills 1 in (2.5 cm) deep, and 2–3 ft (60–90 cm) apart, depending on the size of the variety. Sow dwarf varieties in closer rows, 1 ft (30 cm) apart. Sow the seeds, which are relatively big and easy to handle, at the rate of five or six seeds per 1 ft (30 cm) run. Start thinning when the plants reach a height of about 8–10 in (20–25 cm), so that they are eventually spaced 14–18 in (35–45 cm) apart. As with planting, try to sow in square blocks rather than long rows to ensure that the pollen will move from plant to plant for fertilization.

Pollination

The reproductive system of sweet corn is more complicated than most other vegetables, but an understanding of it will make it easier to produce good crops. Male and female flowers are borne on the same plant. The male flowers are the rather unattractive, dull brown long tassels at the top of the stalk, while the female flowers ("silks") are lower down the plant. When the silks are creamy white, wind-borne pollen from the male flowers must come into contact with these for pollination to take place. Once fertilized, the embryonic grains at the base of the silks will begin to grow, with the fully ripened ear as the end product. If the weather is very still and windless at the time pollination would normally occur, gently shake the male tassels to release the pollen. If you cannot see the dustlike pollen floating down, then repeat the procedure daily until it is visibly released.

Because corn is wind-pollinated, it is a much safer bet to grow sweet corn in square blocks of planting, rather than in single lines. Although single plants may look attractive when dotted around the vegetable garden, the chances of the pollen reaching the female flowers successfully are greatly diminished.

THINNING AND FINAL SPACING

Start thinning when plants are 8–10 in (20–25 cm) high; space 14–18 in (35–45 cm) apart.

Planting corn in square blocks instead of long rows ensures a higher rate of pollination, reduces the amount of wind damage.

Lastly, unless you are growing a non-hybridized strain, such as Golden Bantam, do not attempt to save the seeds for planting the following year. All of the modern hybrids are the F_1 generation, produced by crossing two selected strains, a process which the seedsmen do every year. Seeds of F_1 hybrids do not come true; that is, if planted, the progeny is unlikely to resemble the parent plant. Some F_1 hybrid strains must not be grown anywhere near other varieties of sweet corn, because their flavor will be adversely affected if cross-pollination occurs.

Care and development

Sweet corn is well able to smother most weeds when growing vigorously and approaching maturity, but in the early stages it often grows slowly, especially during dry or cold weather, and is then very vulnerable to weed competition. Either hand-weed, or hoe lightly to keep weeds down, remembering that corn has a very shallow rooting system and over-vigorous hoeing can do more harm than good. Keep the plants well watered, particularly in dry weather. Do not overwater, however, as this will lead to lush foliage at the expense of ear production.

Liquid feeding is beneficial, at regular intervals from pollination time to harvest; the kinds of liquid fertilizer used for tomatoes are suitable. If the corn appears to stop growing when it is about 1 ft (30 cm) high, and the leaves turn yellow, apply a quick-acting fertilizer.

Some gardeners carefully earth-up their sweet corn plants, as with potatoes, to a height of about 8 in (20 cm) when the plants are about 4 ft (1.2 m) tall. This encourages the production of more roots. A mulch of straw applied in midsummer will retain moisture and also keep down weeds. Some gardeners remove the side-shoots, but this practice seems not to have any beneficial effect.

Harvesting and aftercare

A common mistake is to leave the ears on too long before harvesting. In general, ears will be ready for harvesting about three weeks after the silks have appeared on each plant. To determine when the ears are ripe, watch the silks on

the ends of the ears. While the grains are growing they are moist and pale green. When ripe, they turn dark brown but still remain damp. If they become dry and shrivelled, they have been left too long. The sheath (husk) should be dark green and on no account be left to turn yellow or faded brown.

You can test one of the kernels for readiness by piercing it with a thumbnail. If creamy "milk" spurts out, the ear is ready for picking. If the liquid is watery, the ear is still unripe, and if little or no moisture emerges, it is overripe. Normally, when ears are left too long on the stalk the sugar they contain will begin turning into starch. Because the conversion from sugar to starch takes place as soon as the ear is parted from the parent plant, you should pick the ear no more than half an hour before it is to be cooked.

CARE AND CULTIVATION

1. Water plants well, particularly in dry weather.

2. Mulch with straw in mid-summer to conserve moisture and keep down weeds.

3. To assist pollination, gently shake the male tassels to release pollen.

Male flowers are the dark brown tassels on the top of the stalk (left). Female flowers are the creamy-white silks lower down the plant (right).

To pick an ear, grasp it firmly and split it downwards from the stalk. It should break off easily. Take the big ears from the bottom first, so the plant channels its energy into the smaller ones farther up the stalk. Ears on the same plant will ripen at intervals for a few days, but unless it is an exceptionally hot, humid summer, you are unlikely to get more than two fully grown ears per plant.

Unlike field corn, which can be stored in a dry place for indefinite periods, sweet corn is harvested while succulent and is best used almost immediately (or prepared for freezing) although it will keep for a few days if stored in a refrigerator. Do not remove the husks until you are ready to cook the ears.

The dry stalks of sweet corn after harvesting form a kind of straw which can be used as litter for domestic animals. Alternatively break up the stalks with a sharp spade, and put them on the compost heap.

While it is a fact that sweet corn does not store well, you need not give away your extras or eat corn three times a day to use it up or worst of all, let it go to waste. You can preserve your superfluous crop by freezing it. This can be done fairly simply in whole-kernel or cream style, or the ears may be frozen in corn-on-the-cob style. Ears with plump tender kernels and thin sweet milk are best for freezing. A somewhat more complex way to use your extra corn is to make corn relish—a delicious condiment prized by many and a welcome addition to so many meals all year round.

For a nominal charge, you can obtain complete instructions for the preparation and packing of the different styles of corn for freezing, as well as recipes for the making of corn and other relishes.

Ripe corn has dark brown, damp silks; those on overripe corn are dry and shrivelled (top).

1. Test for ripeness by piercing a kernel; "milk" will spurt out if corn is ripe.

2. To pick, grasp the ear firmly, and pull it downward from the stalk.

Marshall Cavendish

➤*Sweet corn ready for harvest. The best corn is grown in hot, humid summers, although plant breeders have developed improved varieties which will give good crops in spite of cool weather. One advantage of growing sweet corn in cool, temperate climates is that it is relatively pest- and disease-free; grown in its native climate it is vulnerable to a wide range of pests and diseases.*

Write to the United States Department of Agriculture, Washington, D.C. 20250. Be sure to give your complete address, including the zip code.

Exhibition tips

Select ears which have full rows of kernels from the bottom to the top; irregular rows of grain or badly set grain will be considered defective except on those few varieties where it is characteristic. It is difficult to judge the quality of the grain, as it is concealed beneath the husk, so take more than you need to show the bench to have replacements should you need them. The ears shown should be as uniform as possible, with a similar length and girth, and the kernels uniformly colored. Never show ears which have not been freshly picked.

Pests & Diseases

In tropical and subtropical countries sweet corn is troubled by a variety of pests and diseases, from rusts and smuts to weevils and earworms, but gardeners in temperate climates will find this crop relatively pest- and disease-free. While the plants are still at the seedling stage, mice, rabbits and birds can be troublesome, and in severe cases, some sort of protective netting may be necessary. Once the plants are established and growing strongly, these pests will do little damage, but squirrels and raccoons may be damaging at harvest time.

Corn earworm: the worst corn pest in the United States. While the larvae, which

Royal Horticultural Society

Withered leaves of an infested plant.

Murphy Chemicals Ltd

Discolored kernels caused by fusarium rot.

eventually reach two inches, may attack foliage and tassels, their greatest harm is to the ears. Starting on the fresh silk, they work down to the kernels. Spray with Sevin starting when the silks appear and repeat every two to four days, making sure the silks are thoroughly wet. Since the pest winters as pupae in the soil, turn over the soil in late fall.

European corn borer: the next most serious pest over most of the United States but it also attacks any annual or perennial with stems large enough for the borers to enter. The one-inch moths lay their eggs on the undersides of the leaves. Upon hatching, the larvae bore into the stems and bases of the ears. Symptoms are: broken tassels, bent stalks and sawdustlike castings outside of small holes. Depending upon climate, there are one to three generations per year. Spray with Sevin when the tassels are barely discernible and repeat three to five times at five-day intervals. As soon as the crop is harvested, burn all stalks and turn the stubble under. Each fall, clean up and destroy all weeds and debris capable of harboring the pest.

Crows: often pull up the seedlings for the seeds. If necessary, soak the seeds before planting with a commercial repellant.

Cutworms: feed at night and hide by day; they sever seedlings at or near the

GUIDE TO SWEET CORN TROUBLES

Symptoms	*Probable cause*
Worms in ears	Corn earworm
Borers in stalks or base of ears	European corn borer
Leaves pale, mottled, with tiny black spots on undersides	Thrips
Plants wilt and collapse; roots brown and stunted	Fusarium rot
Seedlings pulled up	Crows
Seedlings cut off at or near soil	Cutworms
Weak plants, aphids on roots	Corn root aphids
"Boils" anywhere above ground	Corn smut

ground level. Scatter a cutworm/slug bait around the plant in early evening.

Corn root aphids: serious pests transferred to corn by ants. Where permitted, dust seed drills with chlordane at planting. Otherwise, ask your state university for its approved control.

Corn smut: not a systemic disease; large "boils" form on any above-ground part: stalks, prop roots, leaves, tassels, husks, ears. Spores winter in soil, corn debris and manure. They are not seed-borne. Cut off and burn all smutted parts promptly. Leave no debris in the garden.

Fusarium rot: this is a soil-borne fungal infection which thrives in cool soil conditions. If the soil is very wet, so that the sweet corn has difficulty in growing, improve it before planting, and hoe to improve aeration while growing. Infected plants may wilt and collapse for no apparent reason; when dug up the roots will be brown, stunted, and generally unhealthy looking. If the plant manages to grow to maturity, and produce ears of corn, these may show secondary symptoms of fusarium rot: misshapen, discolored kernels, and imperfectly developed silk ends. It is best to dig up and burn badly infected plants, and do not replant the site with sweet corn for several years.

Thrips: these are tiny, elongated yellow, dark brown or black insects which are damaging to many garden plants, such as gladioli, peas and onions. Although not a serious problem with sweet corn, occasional attacks do occur, particularly in hot, close weather. Thrips damage the leaves by piercing the leaf tissue and sucking out the sap. Infested leaves will have speckling and pale mottling and infested growing points will be checked, resulting in stunting. Small black spots on the undersides of the leaves are excreted by the larvae; these minute spots are a sure sign of thrips. Spraying with rotenone, Sevin or malathion as soon as the thrips appear is the best method of control.

Varieties

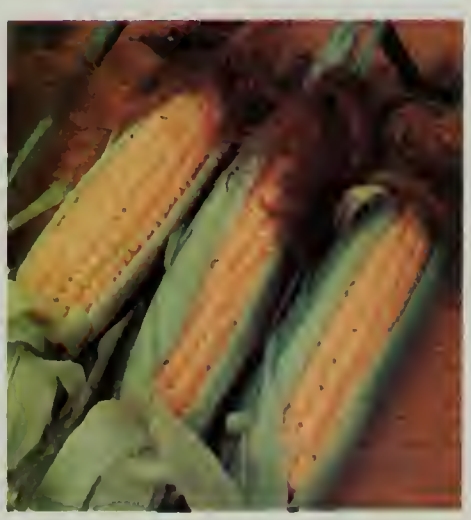
Golden Bantam: medium-sized, bright yellow ears; rich sweet tasting; one of hardiest varieties.

Polar Vee (F_1 hybrid): early cropping variety; best planted in blocks to assist pollination as it flowers very early; ears 6 in (15 cm) long.

Northern Belle (F_1 hybrid): consistently heavy cropper; ears 8 in (20 cm) long.

Brian Furner

▲ *Northern Belle*



Brian Furner

▲ *Earliking*

Early Extra Super Sweet (F_1 hybrid): particularly sweet flavor; harvest when still creamy yellow; best grown away from other varieties of sweet corn; heavy, reliable cropper.

Honey Dew (F_1 hybrid): new introduction; ears 7–8 in (17.5–20 cm) long, sweet tasting.

Honey and Cream (F_1 hybrid): primarily yellow corn, with sprinkling of white kernels; ears 8 in (20 cm) long.

Earliking (F_1 hybrid): early cropping variety; first rate yellow ears, sweet flavored; reliable cropper with ears well protected by dark green foliage.

North Star (F_1 hybrid): very hardy variety, recommended for northern or cold gardens; ears 7–8 in (17.5–20 cm) long, tender and sweet; reliable cropper even in wet summers.

Canada Cross: early variety, vigorous and compact. Good for cool northern areas, short seasons.

Stowell's Evergreen: late cropping plants; one of the good standard white varieties of corn.

Brian Furner

▲ *Golden Bantam*

A–Z Collection

▲ *Polar Vee*

Brian Furner

▲ *Early Extra Super Sweet*

Brian Furner

▲ *Honey Dew*

step-by-step growing guide

Cucumbers

Cucumus sativus (fam. *Cucurbitaceae*)
Half-hardy annual
Sowing to harvesting time: 7–10 weeks
Size: plants to 8 ft (2.4 m) tall in the greenhouse, and 4 ft (1.2 m) in a frame or the open
Yield: greenhouse cucumbers average 20 fruits per plant, outdoor cucumbers 12–15

Like many other salad crops, cucumber really is at its best fresh from the garden. With a little care it is not a difficult crop to grow well, either in the greenhouse or outdoors, and the relatively high yields per plant make it well worth the effort; just three plants will often produce sufficient for the average family's needs.

Main types of cucumbers
There are two basic sorts of cucumbers. The first is the large, smooth-skinned type up to 15 in (37.5 cm) long. This is often called the greenhouse cucumber because in cold climates these need the protection of a greenhouse and lend themselves to forcing out of season elsewhere. These plants are grown as climbers, so the fruits can hang down. The other main type, the conventional outdoor cucumbers, which include gherkins for pickling, are shorter than the greenhouse type. They are about 8 in (20 cm) long, with knobbly or spiny skin.

The new, recently available Japanese varieties produce long, slim cucumbers, like the greenhouse varieties, but have the advantage of being hardier and can be grown outdoors. They are also heavy and reliable croppers.

Lemon cucumbers are a novelty sort with round fruit the size of a small apple, a pale, yellowish-white skin and a good texture. They are generally regarded as more digestible then the green-fruited varieties. A trailing type, they can be grown in pots or boxes in the greenhouse, in a frame, or outside in the garden.

Pollination
Cucumbers produce fruit in two ways. Outdoor cucumbers bear separate male and female flowers on the same plant, and the female flowers need to be pollinated before fruits are produced. In greenhouse cucumbers, the female flowers produce fruit without pollination. These unfertilized fruits are what you should aim to produce in the greenhouse. If your greenhouse cucumbers are fertilized the fruits swell at one end, con

Pat Brindley

Greenhouse cucumbers ready for harvesting. Cut when about 1 ft (30 cm) long.

taining hard, inedible seeds. They are bitter tasting and unpleasant to eat.

Sowing

Outdoor cucumbers may be started indoors about two months before it is safe from frost to set them out. In cold frames they can be sown one month ahead, under coverings two weeks ahead and, if direct-sown outdoors, after danger of frost is past. In the North, greenhouse cucumbers are ordinarily set out after the fall tomatoes are finished (January). Fall crops are sometimes set out in early

August instead of fall tomatoes. To keep idle space busy in summer, seed may be sown in May, June or July.

If you grow cucumbers from seed, it is best to sow them in the house or warm greenhouse, at an absolute minimum temperature of 60°F (15°C), but 65–75°F (18–25°C) is better. Select only plump, clean seeds and throw away any which are flat, discolored, or very small. Sow the seeds singly in clean, 2½–3 in (6–7.5 cm) pots, which have been filled with a good friable seed mixture to within ½ in (1.3 cm) of the top of the pot. Place the seeds on edge, sideways, about ½ in (1.3 cm) deep and lightly firm the surface. Water the mixture and then cover the pots with black plastic or a sheet of glass and brown paper. Make sure the mixture is thoroughly damp, because the seed casings are fairly tough. If there isn't enough moisture in the soil to penetrate the casing, the seed may not germinate. After germination, remove the covering; place plants in a light position in a window or greenhouse. The young plants should grow rapidly and will need staking with a small, split cane. Keep the temperature at 60°F (15°C), minimum; do not let the temperature drop at night.

White roots should show on the outside of the rootball within a month of sowing; when you can see them, pot the plants into 4–5 in (10–12.5 cm) pots of a good potting soil, or into their final positions if you can maintain a high enough temperature.

Cucumbers require a rich, moist, well drained and aerated rooting medium. Greenhouse varieties are most successfully grown in beds raised above ground level. The base of the bed can be soil, ash gravel, or concrete. Make sure the base is absolutely clean before building the bed.

Planting

When the pots are full of roots, and two to four leaves have fully expanded, nip out the growing point and plant the young cucumbers into 9 in (23 cm) pots. When these plants have eight or nine leaves and are 1½ ft (45 cm) high, plant them directly into the bed. They should be 2 ft (60 cm) apart, in one line down the center of the bed.

Training

The cordon training of indoor cucumbers is roughly similar to that of tomatoes. Fix three wires horizontally, the top one 7 ft (2.1 m) high, the center wire 3⅓ ft (1 m) high and the bottom wire along the surface of the bed; all three wires should be 1 ft (30 cm) from the outside glass of the greenhouse. Next fix a verti-

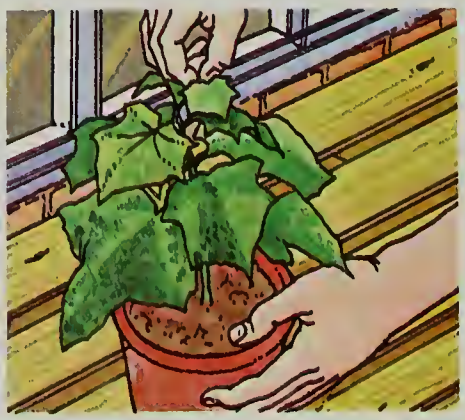
RAISING GREENHOUSE CUCUMBERS

1. Sow seeds in seed mixture. Gently firm the surface and water.

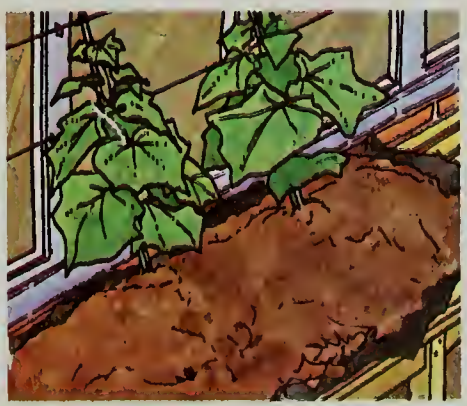
2. Cover with black plastic or brown paper and glass, until germination.

RAISING GREENHOUSE CUCUMBERS

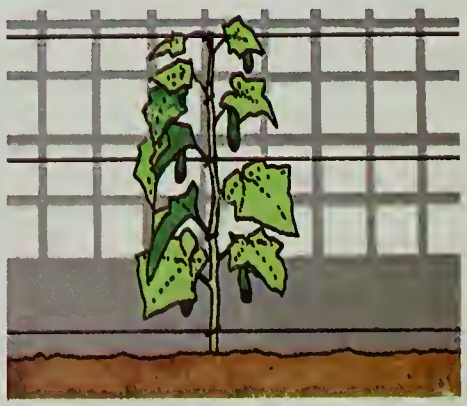
3. When white roots show on outside of rootball, plant in larger pot.



4. When roots have filled 5 in (12.5 cm) pots, nip out growing point.

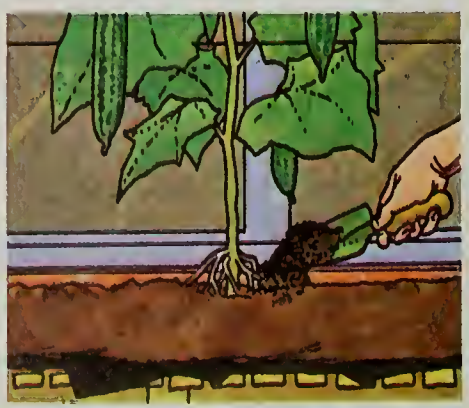


5. When plants are 18 in (45 cm) high, plant them into the growing bed.



6. Train the young plants up strings fixed to horizontal wires.

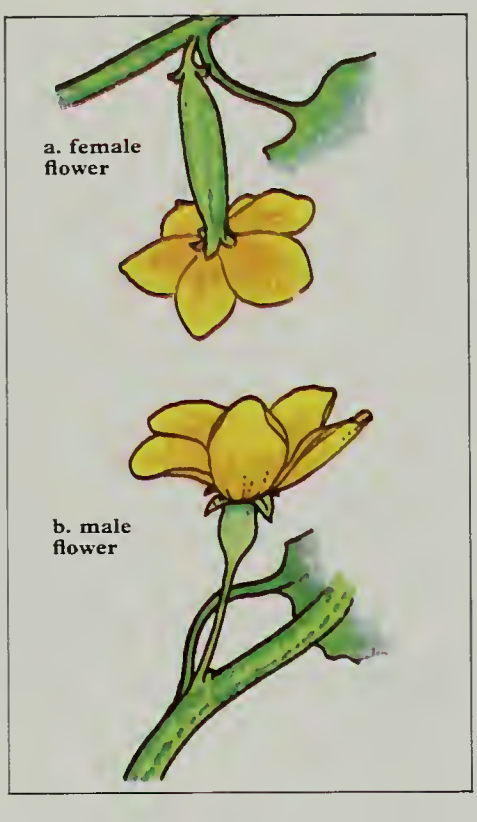
7. Damp down the greenhouse often, particularly in hot weather.



8. Top-dress with 1 in (2.5 cm) of potting soil to encourage roots.

cal string for each plant, tying it to the top, center and base wires. Tie the leading shoot to this string at regular intervals. When the plant reaches the top wire, pinch out the growing point and tie in the lead growth. Remove all side shoots up to a height of 15 in (37.5 cm) above the base of each plant. If fruits form in the first or second leaf joints of the laterals, pinch out at two leaves beyond the fruit. If there are no fruits, stop the laterals at the second joint.

Continue tying the plant to the vertical string, stopping side shoots and removing all male flowers, if present, until the top wire is reached. You can easily recognize male flowers, as they have no miniature cucumbers behind the petals. Remove any cucumbers which start to develop on the main stem.



Care and development

Cucumbers must be given plenty of moisture and warmth at all times, but particularly in hot weather. If you allow them to dry out at all, wilting plants and flabby fruits will follow. The atmosphere in the greenhouse should be very humid. Damp down two or three times a day, always using water which is the same temperature as the greenhouse. Use a hose, a syringe, or a watering can with a rose spray to moisten the floors, walls, benches and pots, as well as the plants. When the temperature in the greenhouse rises above 75°F (24°C), you should provide ventilation, to keep the air circulating around the plants.

It is difficult to lay down hard and fast rules concerning feeding. It is generally considered best to apply a high nitrogen food when the fruits start to swell; continue feeding twice weekly.

Top-dress the beds with a 1 in (2.5 cm) layer of a good potting soil once a month. This helps nourish the surface roots and also encourages new adventitious (extra) roots to form at the base of the stem. The cucumber's thick coarse rooting system is particularly vulnerable to infection by fungus and bacteria, and may rot part way through the cropping season, so the continual production of healthy new roots is very important.

It is also a good idea to fix fine gauze to any ventilation openings in the greenhouse to exclude bees and flies which may enter and pollinate the female flowers. These are generally "all female" varieties. They produce very few, if any, male flowers and are capable of extremely high yields.

Growing cucumbers in frames

In cold short-season areas such as the mountains or parts of Canada and Alaska where a greenhouse is not available, cucumbers can be grown successfully in a hotbed or cold frame. The frame should have a stout wooden, concrete or brick base to retain warmth. Raise the seedlings as for greenhouse cultivation. In late spring place the young cucumber plants in the center of the frame. Keep the frame closed, except for occasional ventilation on warm days,

Grant Heilman

▲ *Do not remove any flowers from outdoor varieties; pollination is essential to produce fruit.*

but when the weather is very warm leave the frame lid open all day. Remember to replace it at night, when the temperature drops.

Pinch out the growing tips when four or five leaves have formed on each plant. Shortly afterwards, shoots will be produced in the axils (joints) of these leaves. Select the four strongest shoots and train one towards each corner of the frame. Carry out watering, feeding, and pinching out side shoots as described above. As the fruits develop, place a sheet of glass or piece of slate under the fruits, to keep them from becoming soiled or discolored. Shade the plants from strong sunlight to prevent scorching.

Growing outdoors

Conventional or regular cucumbers will grow and crop under lower temperatures and drier atmospheric conditions than the greenhouse varieties. Sow the seeds directly outdoors, under protective covers, or indoors for an earlier start.

Cucumbers will grow in any well-drained soil, as long as it is not too acid. Dig in a generous helping of garden compost, well-rotted manure, or leaf mold 1 ft (30 cm) deep and the same width. Cover this with the excavated soil, which is then molded up into a low, flat-topped ridge. This allows the water to drain away from the main stem; although the roots like a lot of moisture, stem canker may set in if the base of the stems get too wet. If you are having more than one ridge, leave a good 4 ft (1.2 m) between them.

If your soil is very light, the ridge system will not work because enough moisture will not reach the roots. A good alternate method is to dig the organic matter into holes 3 ft (90 cm) apart and 1 ft (30 cm) deep by 2 ft (60 cm) square. Over this place a 4 in (10 cm) layer of good rich soil, making sure it is flush with the level of the surrounding ground. Lightly fork in a complete fertilizer at the rate of 2 oz per sq yd (60 g per sq m)

two weeks before planting and again when the plants are beginning to grow well.

Sow the seed in the open in late spring or early summer (as soon as the soil has warmed up) or two or three weeks earlier under protective covers. Sow a group of three seeds, point downwards, on each prepared trench, 1 in (2.5 cm) deep or 3 ft (90 cm) apart on the long ridges. Keep the seedlings covered with a jam jar or other cover until they are established. Then select the strongest of the three and discard the others. If you plant out seedlings sown in the greenhouse, harden the seedlings off first so they can withstand the lower temperatures.

Remove the growing tips when the plants have produced six leaves. Train out the resulting side shoots, evenly spaced, stopping those which have produced fruit at the seventh leaf, and stopping further shoots if the plant needs restraining. This practice encourages the plants to devote more energy and nourishment to the swelling fruits and less to unproductive vegetative growth.

Do not remove the male flowers, as the female flowers must be fertilized before the fruits will develop. Insects usually pollinate the flowers, but you can hand pollinate the female flowers with the male flowers. Remove the male flower by its stem and carefully take off the petals. Then shake the powdery central core into the center of the fully open female flower.

Water the plants frequently in dry weather, being very careful to keep water off the base of the main stem. Spray with a hard stream both sides of the foliage on dry days to keep red spider mite away. Feed the plants as for greenhouse varieties, first when the fruits begin to swell, and again at two-week intervals.

The outdoor Japanese varieties benefit from supporting frames on which to grow. Buy 6½ ft (2 m) poles and insert them so they are 6 ft (1.8 m) above the ground and 6 ft (1.8 m) apart. Run wires between them and attach netting with an 8 in (20 cm) mesh. At each end of the

PLANTING CUCUMBERS OUTDOORS

1. Dig compost or manure into trench and cover with soil ridge.

2. For light dry soil, dig in manure and plant cucumbers on flat.

3. Sow groups of 3 seeds 3 ft (90 cm) apart and 1 in (2.5 cm) deep.

POT-RAISED SEEDLINGS

1. Before planting out, form a hole in the soil using an empty pot.

2. To remove plant from pot, upend the pot and tap out on a table edge.

3. Put plant into preformed hole and water with tepid water.

row, use much stouter posts, with straining wires to pegs in the ground for lateral stability. Plant the cucumbers 1 ft (30 cm) apart. Train the plants upwards, pinching out the lead growth when they reach the top of the net. Stop the side-shoots as described above for ordinary varieties.

Since they produce problems in the form of insects and diseases that thrive in them, weeds must never be allowed to remain among your garden vegetables. Pull them out regularly and carefully to help your plants stay healthy. Some home gardeners cover cucumber plants with a special cloth to help keep away beetles and aphids. If you use this type of protection, be sure to remove it as needed to clear the area of weeds.

Harvesting

Greenhouse cucumbers should be cut when about 1–1¼ ft (30–38 cm) long. Harvest the regular outdoor cucumbers when they are young and crisp; old fruits go to seed and if left on the plant cause further fruit production to cease. If you have a bumper crop, pickle them or give the extra cucumbers to friends or neighbors. Cucumbers are at their best when freshly picked; they do not store well.

Pickle the cucumbers as soon as possible after you have picked them. If you cannot, it is important to refrigerate them as they deteriorate rapidly, especially at room temperatures. Cucumbers can be processed into brined dill pickles, which are cured for about three weeks, or the faster fresh-pack pickles or slices. The latter two are brined for several hours or overnight and are crisp and tender with a pungent, tart flavor.

For complete information on equipment and procedures for pickling cucumbers, send a post card to the United States Department of Agriculture, Washington, D.C. 20250. Ask for the booklet *Making Pickles and Relishes at Home* and give your complete address, including zip code. Follow the detailed procedures carefully in order to produce pickles of good quality that are safe to eat.

CULTIVATION

1. If directly sown, thin to one plant per group when first leaves appear.

2. Keep the plants well watered if the weather is dry.

3. Nip off the ends of sideshoots one leaf beyond the young fruit.

4. To pollinate female flower, brush with the anthers of a male flower.

5. Protect cucumbers from soil by placing a pane of glass under them.

6. Harvest the cucumbers when they are about 5 in (12.5 cm) or more long.

Exhibition tips

The judges will look for straight fruits of uniform thickness, with short necks and noses. Cut the fruits early in the morning or late in the evening when they are fully charged with water. They are at their best when the two sides are approximately parallel and straight. A pointed cucumber is not yet ripe; a misshapen yellow one will not win prizes.

Cucumbers are sometimes shown in pairs, when between 1 ft (30 cm) and 15 in (37.5 cm) long. Cut the fruit with a length of stem; it can then be handled by the stem and the bloom will not be damaged. The flower should still be on the end; the fruit should be young, crisp and tender.

If the fruits you intend to show are at their best a few days before the exhibition, cut them off the vine, and place them stem downwards in a jar of water. Change the water every day.

Pests & Diseases

The warm, moist conditions in which cucumbers flourish provide the perfect environment for bacterial and fungal infections. Since many of these are encouraged by improper watering and ventilating (indoors), make sure you are cultivating the plants properly. Be on the lookout for any sign of infection and act quickly to control it, because disease spreads rapidly in a close greenhouse. When you use an insecticide on cucumbers, be sure to choose one that will not damage the plants; the *Cucurbitaceae* family are sensitive to some chemical sprays.

Red spider mite: this pest causes the leaves to turn yellow; if severely infected, the plant will become bronze colored, wilt and collapse. Another sign of red spider mite is the appearance of silky webs around the leaves and stems. The best preventative action is to maintain damp conditions in the greenhouse or outdoors. The best control is to spray the infected plants with derris or soft soap.

Aphids: these small green insects are usually found in colonies on or near the growing points and under the leaves, which may turn yellowy green and wither. Control aphids by spraying with Sevin, rotenone or pyrethrum.

Whitefly: if, when you disturb the leaves of cucumber plants, clouds of minute insects appear, then the plants are infested with whitefly. These insects are very destructive and weakening; they feed chiefly on the sap and excrete honeydew which encourages the growth of sooty mold. Spray with malathion or other permitted material as soon as whiteflies are seen.

Slugs: slug damage can usually be spotted by holes in the stems of young plants and the presence of silvery slime trails.

GUIDE TO CUCUMBER TROUBLES

Symptoms	*Probable causes*
Leaves turn yellow; minute silky webs on plant	Red spider mite
Small green insects; leaves turn yellow	Aphids
Clouds of minute insects	Whitefly
Holes in stems of young plants, silvery slime	Slugs
Seedlings cut off just above soil	Cutworms
Leaves discolored, plant collapses	Root knot eelworm
Gray fluffy growth on stems, fruit and leaves	Botrytis
Leaves wilt, stem becomes dark, plant dies	Collar rot
Leaves mottled yellow; plant wilts, dies	Mosiac virus
Leaves turn yellow from base upward	Verticillium wilt
Sunken, oozing spots on fruit	Gummosis
White coating on leaves	Mildews

Murphy Chemical Co.

▲ *Adult whiteflies on the underside of the leaves of cucumber foliage.*

Ministry of Agriculture Fisheries and Food

▲ *Furry growths on young cucumbers produced by a severe attack of botrytis.*

Proprietary baits are the most effective control. The same baits are also effective against cutworms which cut off seedlings just above the soil.

Root knot eelworm: plants indoors and outdoors may be attacked by these microscopic pests which invade the roots. Leaves may become discolored; in bad cases the whole plant may collapse. Although some plants may survive mild infections, it is best to dig up and burn any diseased plant. There is no absolutely effective control, but if one plant is infected, it is a good idea to plant marigolds around the plants or treat the soil with a sterilant such as formaldehyde before growing susceptible crops in the same place.

Botrytis: this gray fluffy growth on the stems, fruits, and leaves is best controlled by approved fungicidal sprays. Badly infected plants should be removed and burned, as they will never crop well.

Collar rot: this usually affects greenhouse cucumbers which are growing in badly drained soil or have been overwatered. The plants are attacked by soilborne organisms at or slightly above ground level. The leaves wilt, the stems become dark and the plants die. Preventive measures of raised beds, well-aerated soil, and good hygiene are useful. Plants which are not too badly damaged may be saved by removing all decaying tissue and dusting the infected areas with captan. Then raise the level of the soil 1½ in (3.8 cm) around the stem to encourage the growth of new adventitious roots. Pull out and destroy badly infected plants; treat the soil around adjacent plants with an approved fungicide.

Mosaic virus: the leaves of plants infected with mosaic virus become yellow and mottled; the whole plant then rapidly wilts, shrivels up and dies. Since there is no effective control for the virus, and it is carried by aphids, the best prevention is to control aphids.

Gummosis: this fungus disease affects plants grown in a greenhouse; it spreads quickly in cold, wet conditions. Infected fruits develop sunken spots which ooze a gummy liquid; this spot is eventually covered with dark spores. Occasionally small spots appear on the stems or leaves. Keeping the greenhouse warm

Ministry of Agriculture Fisheries and Food

▲ *The roots of plants infected with collar rot are swollen, discolored and distorted.*

Harry Smith

▲ *Leaves infected with cucumber mosaic virus display characteristic yellow mottling.*

and well ventilated is a good preventive measure. Control gummosis by spraying with an approved fungicide; destroy all diseased fruits. Disinfect the greenhouse or frame before replanting.

Verticillium wilt: this soil-borne fungus causes the leaves to turn yellow from the base upwards. The disease is more liable to occur in cold wet conditions. It usually attacks the roots of young plants; older plants are vulnerable if they have open wounds. Eventually the diseased plants wilt, and should be dug up and burned.

Anthracnose: the leaves will have small pale patches which quickly turn brown and grow bigger until the whole leaf dies; stems are sometimes affected. Remove and destroy badly infected plants. Spray the remaining plants with an approved fungicide. Make sure that greenhouses are well ventilated, and spray with formalin when empty or between crops.

Downy and powdery mildews: these appear as white coatings on the leaves. The usual sprays for the other diseases should keep them in check. Damp leaves aid their spread indoors or out.

Striped cucumber, flea and other beetles as well as leaf hoppers and occasional caterpillars are readily controlled with a spray of nonpoisonous Sevin.

Cutworms: these garden pests usually feed at night and hide just below the soil during the day. They eat through the young shoots at soil level, causing seedlings to collapse. Protect cucumbers by working a small amount of an approved insecticide dust into the soil. A collar of pliable cardboard around young plants also gives protection.

Thrips: these minute insects suck sap from plants and scrape the tissues. Thrips are spindle shaped, with two pairs of narrow heavily fringed wings. Silver mottling and deformation of leaves and stems are symptoms. Thrips multiply fastest in hot, dry conditions. Spraying with Sevin is the best control.

Blossom end rot: this physiological disease happens most often when drought follows a period of good moisture. Dark, shrunken blotches appear on fruits at the end away from the stalks and there may be rotting of underlying tissue. Prevent by watering thoroughly in dry weather and mulching to conserve moisture.

Brian Furner

Japanese Long Pickling

Pat Brindley

Femdan

Varieties

Cucumber varieties offer the home gardener a good choice of size, shape and flavor and many are disease-resistant.

Outdoor type

Burpee Hybrid: popular, disease-resistant, slicing type; vigorous and prolific with crisp, white flesh. Can be greenhouse grown.

Burpless Hybrid: a hybrid version of Japanese Long; peeling unnecessary. Vigorous, prolific; does well on fence.

Hi Pik: a gynoeceous hybrid pickler; outstanding yielder. Resists mildews, anthracnose, angular leaf spot, mosaic. For warm climates outdoors.

Japanese Long Pickling: long and slender, grows to 18 in (45 cm); crisp, mild, burpless.

Lemon: yellow with size and shape of a large lemon; flesh sweet, delicious.

National Pickling: shorter, blunter than most; a favorite pickler. Prolific.

Spartan Valour: tapered, dark, slim, long; mosaic- and scab-resistant.

Straight 8: an old favorite, prolific, early; reliable, high quality.

Tiny Dill: finger-long, extra early, vines compact, space-saving, good pickler.

Brian Furner

Patio-pik, an English variety.

Brian Furner

Farbio

Pat Brindley

▲ *Burpless*

Brian Furner

▲ *Venlo Pickling, popular abroad.*

Brian Furner

▲ *Kyoto, a Japanese variety.*

Brian Furner

▲ *Lemon*

Marketmore 70: fruits straight with rounded ends; for cold frame and early production outdoors. Resists scab and mosaic.

Spacemaster: vines 2/3 shorter; fruits large, well-shaped, plentiful. Dependable, mosaic-resistant.

Victory: heavy-bearing, extremely early slicer; resists scab, mosaic, anthracnose and mildews.

West India Gherkin: not strictly a cucumber but a favorite for very small pickles. Oval, 2 in (5 cm) long. Very prolific; pick young.

Wisconsin S.M.R. 12: slightly longer than National Pickling, more tapering; vigorous, productive.

Greenhouse sort

Farbio: F_1 hybrid, no male flowers; fruits 15 in (37.5 cm) long, high quality. Useful for year-round cropping.

Femdan: F_1 hybrid, sets fruit quickly; continuous yielder so needs extra feedings. Needs less pruning.

La Reine: F_1 hybrid, no male flowers; plant vigorous with strong laterals. Not bitter under unfavorable conditions.

Sandra: F_1 hybrid, all-female. Adapted to all seasons. Vigorous, nonfading in summer heat. Good keeper.

Toska 70: very high yielder during winter; top quality. Resists spot and gummosis but less vigorous than other gynoeceous types.

step-by-step growing guide

Black Currants

Ribes nigrum (fam. *Saxifragaceae*)
Hardy deciduous shrub, with a useful life of twelve years
Size: bush about 5 ft (1.5 m) high and wide
Planting to harvesting time: two years
Yield: 9 lb (4 kg) average per bush

Black currants are an easy soft fruit to cultivate and require a moist climate for best results. Unfortunately, however, they are alternate hosts of the white pine blister rust and may not be grown in regions where these trees are found. In fact, black currants are almost unknown in the United States. Some are grown in Canada. These delicious juicy berries are the richest in vitamin C of all the garden fruits and their sharp, tangy flavor has made them popular for pies, puddings and jams.

Four black currant bushes at or near full cropping capacity will probably satisfy the needs of most families. It is a good idea to plant a range of varieties; this is not necessary for cross-pollination, but it will spread the picking and flowering seasons, and be an insurance against a single frost causing crop failure. Plant in early spring. Make sure you buy healthy two-year-old plants, preferably certified clean stock, as supplied by most reputable nurseries. Plants which are not certified are liable to diseases, and they may give diminished yields.

Suitable site and soil
Choose a warm spot, sheltered from cold winds; this is essential because the flowers are prone to frost damage, causing a drop in yield. An open sunny aspect is preferable, but the crop will tolerate partial shade.

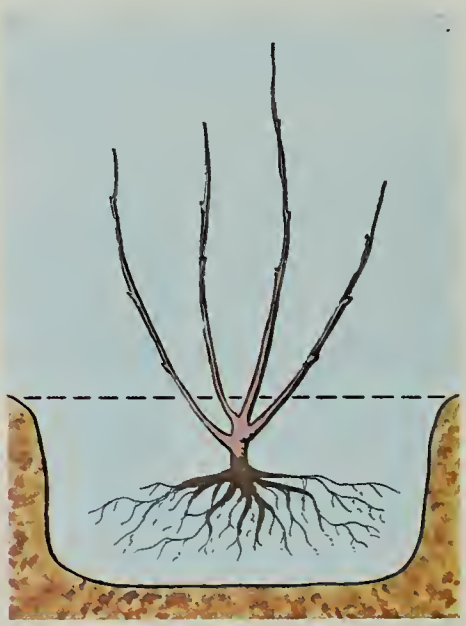
Black currants will put up with wetter soils than most other fruits; however, the best results are to be had on deep, rich, moist well-drained sandy loams. A mildly acid soil is the best: on testing you should have a pH reading of 6 or 7, so adjust the content of the soil to give this reading.

Preparing the soil
Acid soils with a pH value of 5.5 and below require sufficient ground limestone to raise the pH to 6.5, to be applied before planting in late autumn or winter. To raise the pH from 5.5 to 6.5 on a medium loam will require a dressing of ground limestone at the rate of 24 oz per sq yd (800 g per sq m).

On soils such as those occurring in limestone districts, where the soil pH is

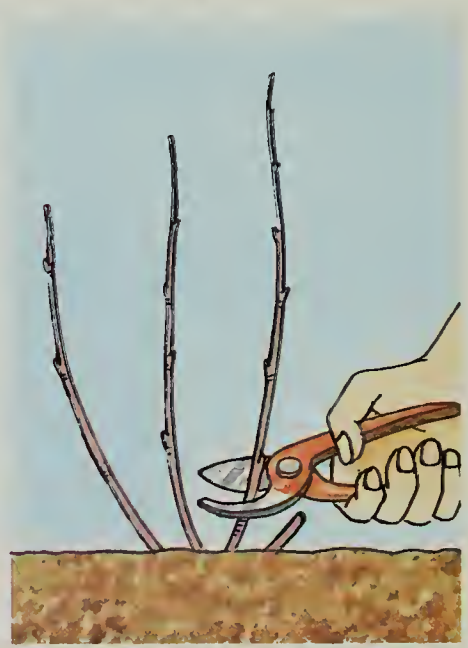
PLANTING A BUSH

1. Prior to planting, dig the ground thoroughly to a depth of 1 ft (30 cm), incorporating manure.



2. Plant the bush with enough room for the roots to spread. Place the soil mark about 2 in (5 cm) below ground.

3. After planting, fill in the hole and gently heel in the soil to firm the ground around the bush.



4. Immediately after planting, use shears to cut back every shoot to 1 in (2.5 cm) above the ground.

GENERAL CARE

Several months after planting, work in a compound fertilizer around the roots of the bush.

Apply a mulch of well-rotted manure or garden compost to nourish the bush and help retain moisture.

7–7.5, be sure to work in plenty of peat before and during planting.

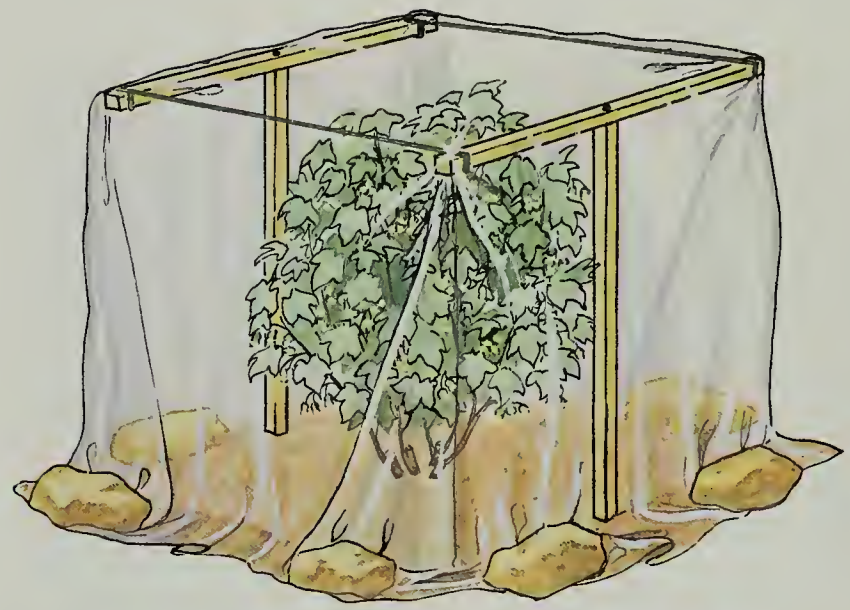
Before digging over the ground, dispose of perennial weeds, such as nettles, thistles and couch grass. Fork them out carefully and remove them from the site. Weed-killers can be used, provided you allow sufficient time so that no harmful residues remain at planting time.

Dig the ground over, to a full spade depth of 1 ft (30 cm), about six weeks if possible before planting and work in manure, compost or leafmold at the time of digging. The rate of dressing of organic matter should be one wheelbarrow load per 2 sq yd (1.7 sq m) of ground. If this sounds rather heavy, bear in mind that these plants occupy the site for a number of years.

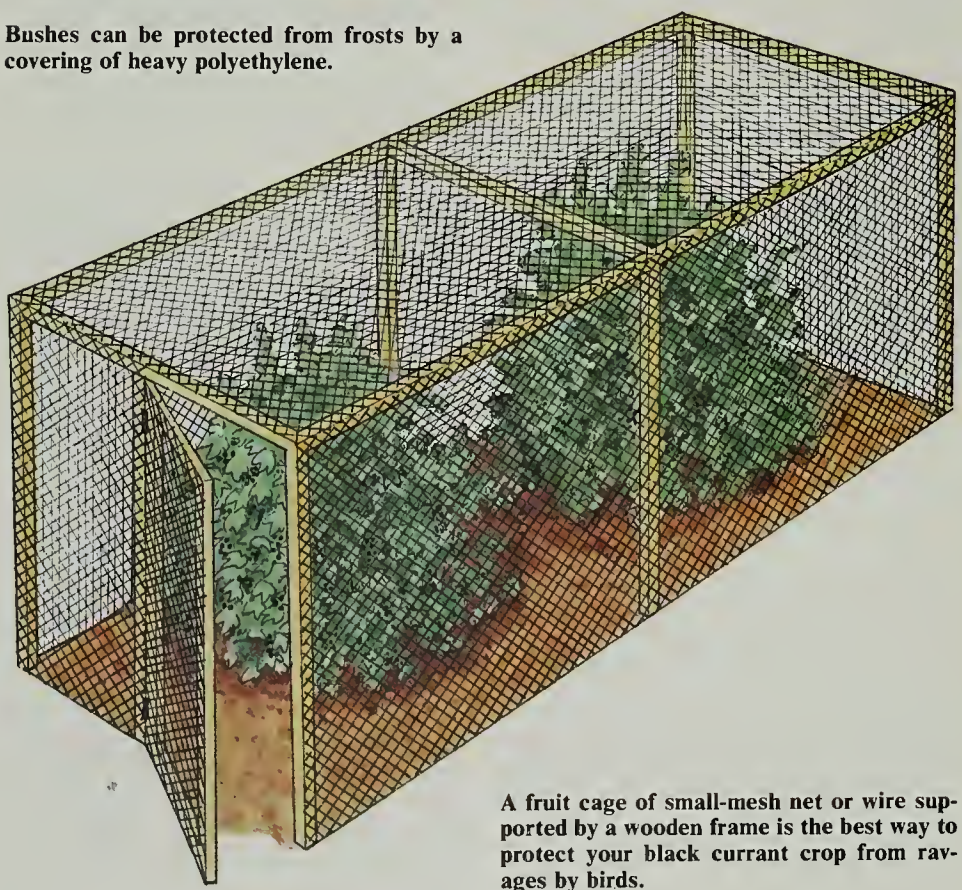
Black currants respond well to generous dressings of nitrogenous foods, so, following the digging-in of organic matter, provide extra plant food by forking into the surface a dressing of 1½ oz per sq yd (45 g per sq m) of sterilized bonemeal, together with 1 oz per sq yd (30 g per sq m) of sulfate of potash. Better, apply a dressing of complete garden fertilizer at 4 oz per sq yd (120 g per sq m). The analysis of the general fertilizer should be approximately 7% nitrogen, 7% phosphate, 12% potassium.

Planting

Space the plants at 6 ft (1.8 m) apart. Dig a planting hole big enough to spread the roots out in their natural directions without being cramped. Black currants, when established, have a number of main stems arising at or just below ground level, unlike gooseberries, red currants and white currants which grow on a leg or single stem. To encourage this habit of producing vigorous stems low down, bushes should be planted 1–2 in (2.5–5 cm) deeper than they were in the nursery. The nursery level will be indicated by a soil mark, where the stem changes color.



Bushes can be protected from frosts by a covering of heavy polyethylene.



A fruit cage of small-mesh net or wire supported by a wooden frame is the best way to protect your black currant crop from ravages by birds.

Eric Crichton

←*High-yielding black currant bushes are an excellent investment where they can be grown. Be sure to leave adequate space for development when you first plant them.*

When each bush is placed in its planting hole, work in the soil around the roots and firm it with your heel.

Immediately after planting cut every shoot to within 1 in (2.5 cm) of the ground to just above the first or second visible growth bud. This cutting back ensures that the bushes develop good root systems and strong vigorous stems, but they will not produce fruit the first year. If there have been some hard frosts after planting and the bushes and soil have loosened as a result, be sure to firm the soil around the roots again.

Aftercare

Water the plants early in the season following planting if the weather is dry. Black currants need moisture more than most fruits. Mulching to conserve moisture and smother weeds should be carried out early. Remove weeds and keep them under control as soon as they appear, to prevent them competing with bushes for moisture and to reduce the risk of other hosts for pests and diseases.

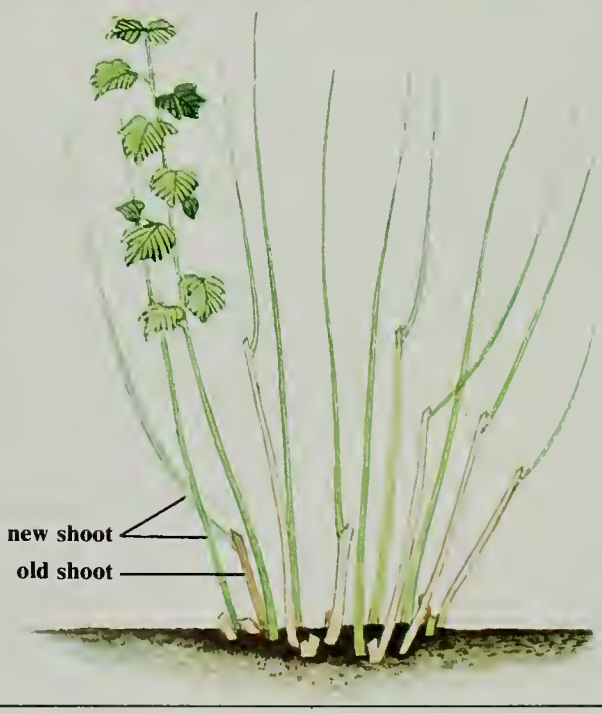
Black currants grow and crop better with generous dressings of manure or compost, or peat and fertilizer. In early spring each year, scatter and work in 1 oz per sq yd (30 g per sq m) of sulfate of ammonia and ½ oz per sq yd (15 g per sq m) of sulfate of potash over the bed. Where the soil is acid, use nitrate of soda instead of sulfate of ammonia.

Working in the fertilizer can be carried out with a rake if the soil surface is crumbly and friable. If the surface has become compacted after the winter, use a hand cultivator or garden fork to loosen the surface and work in the fertilizer before a mulch is applied.

Mulching will feed the bushes, besides its other functions. A mulch of manure or compost laid on top of the soil should be applied at the rate of 1 wheelbarrow-

PRUNING

Pruning from the second year is to encourage new wood, as this bears the most fruit the next year, and to build up a good bush shape. Prune to the ground, or to a low-growing shoot, and ignore new growth at the tip of old wood. Low-growing branches, crossing branches and those which are diseased are cut out first, followed by those branches in the center of the bush, to let in light and air. Finally, a proportion of old wood is cut to a low shoot, or is removed entirely.



load to 3 sq yd (2.5 sq m). If no manure is available, double the quantities of fertilizers and mulch with moist peat or pulverized tree bark.

Frost protection

The greenish white flowers are borne in hanging clusters of four to twelve, or even more in early to midspring.

To protect the bushes from frost, cover the bushes at night with burlap, cloth or plastic attached to a light framework.

Pruning

In the winter following planting, little pruning will be needed, but any weak growths can be cut back to the first bud above ground level. Immediately after the first harvest, the second winter after planting, pruning should be carried out.

Black currants bear most of their fruit on the new shoots produced the previous summer, so the aim of pruning is to encourage the growth of strong new wood from the base of the plant. Most of the new shoots will be retained, and some of the older wood which also bears a quota of fruit. First cut away low-growing growths which hang down to the ground, also any which are dead, broken or obviously diseased, and any that are crossing or awkwardly placed. If the center of the bush is crowded, remove some of the shoots there to let in light and air.

Finally, remove about one-fifth of the older wood that remains. Make your cuts above a good new low-growing shoot or close to the ground to encourage new growth lower down, and ignore promising growth at the tips of these shoots.

When the bushes are well established, after about four seasons, remove roughly one-third of the old wood each winter. Where growth is very vigorous remove less, but if it is weak and needs stimulating, then prune more severely.

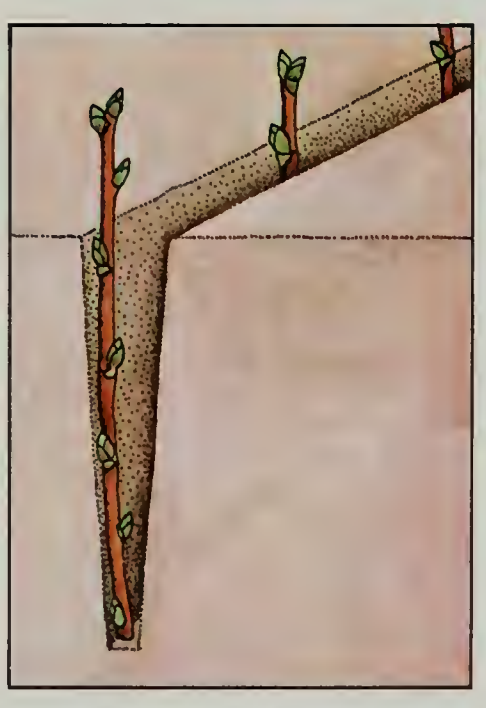
Harvesting

The bushes will need some protection, by the use of netting or a wire cage, from the ravages of birds as the fruits ripen. Fruits are ready for picking when they are black or nearly so; the time of ripening depends on the variety you choose. Always pick when the fruit is dry; wet fruit goes moldy very quickly. For quickness, berries can be stripped off their stalks using a kitchen fork, but fruits picked off a truss or cluster are less likely to go moldy and will keep for four or five days in cool conditions. Some varieties do not ripen evenly so that on the cluster of fruits some berries are ready for picking while others are still green. In this event stripping off fruits with a fork is not very practical.

Propagation

Hardwood cuttings, an easy and convenient means of propagation, should be taken in late autumn from healthy bushes. Under no circumstances should cuttings be taken from diseased bushes to replace those about to be destroyed.

Cuttings are prepared from shoots of ripening wood, about 8–10 in (20.5–25 cm) long, cut just below a bud. Dig V-shaped trenches about 6 in (15 cm) deep.



To propagate plants, take cuttings in late autumn and insert them in the ground with some buds below the soil.

Bernard Alfieri

To harvest black currants, strip the ripe fruit straight into a colander.

Some sharp sand placed in the bottom of the "V" trench is a useful aid to rooting. Put in the cuttings, leaving two or more buds above ground, and spaced at 6–8 in (15–20.5 cm) apart. These shoots are then firmed in. Unlike gooseberries and red currants, black currant cuttings do not have any of the buds rubbed off before inserting into the ground.

By the following autumn, the cuttings will be ready for transplanting into their new quarters.

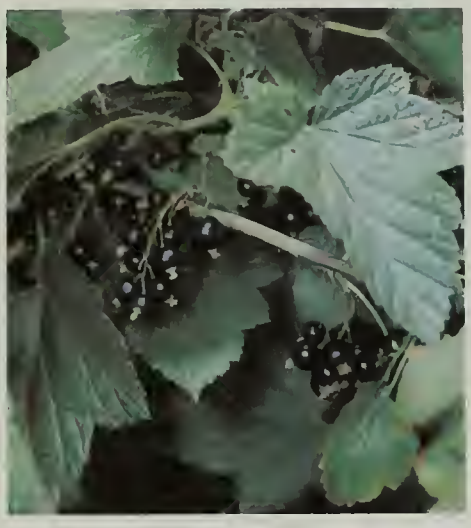
Softwood cuttings (i.e. immature shoot tips) about 3 in (7.5 cm) long taken in late spring to early summer and rooted in a shaded frame, is an alternative method of propagation. When the cuttings are rooted, increase ventilation gradually until the frame is removed.

Varieties

These fall into a number of categories, but are usually classified according to the time of fruiting, namely—early, mid-season, and late varieties. However, the time and habit of fruiting differ within these groups. Some varieties, such as Seabrooks Black and Boskoop Giant

Pat Brindley

▲ *Boskoop Giant*



A – Z Collection

▲ *The Raven*

may be set back by frost (possibly because they lack leafy cover for the flowers).

Among currants, the red varieties are the only type available extensively throughout North America. The white varieties are seldom seen and government regulations forbid the growing of black currants in most of the United States because of their affinity for spreading white pine blister rust. Black currants may be grown, however, in Canada and other countries abroad. The rundown of black currant types that follows is of those available to gardeners abroad.

The list is by no means exhaustive, but these varieties are well tried and proven by commercial growers and amateurs. Most have some resistance to diseases.

Early varieties

Mendip Cross: large spreading bush; flowers midseason; berries medium to large, heaviest cropper of the early sorts; moderately resistant to leaf spot.

Boskoop Giant: a very old, but well tried variety; vigorous habit, between The Raven and Mendip Cross. Flowers early; large berries, well spaced and easy to pick. The earliest variety to ripen, but tends to have a lighter crop. Moderate resistance to leaf spot.

Tor Gross: similar to Mendip Cross; flowers midseason to late; better quality fruit than Mendip Cross and develops two or three days later; moderate to good resistance to leaf spot.

Midseason

Seabrooks Black: medium upright growth; late flowering, good for exposed or northern areas; berries medium-sized, fruits about seven days later than Mendip Cross; moderately resistant to leaf spot.

The Raven: largest bush of all, open nature, but stiff stems; flowers early, but well protected by the foliage; large sweet fruit of even size and thin skinned. Outstanding for juice and flavoring; not susceptible to leaf spot.

Blacksmith: very vigorous, makes a rather uneven bush; flowers late; prolific cropper, large berries at base of clusters, small at the ends; fruit hidden in foliage. Short season, ripens few days before Baldwin; moderate resistance to leaf spot.

Brodtorp: a newer variety of considerable promise, but requires further trials before a full assessment is given.

Wellington XXX: open habit, inclined to droop with a heavy crop; flowers early, liable to be damaged by frosts and cold winds in exposed sites. Fruit of good size

Donald Smith

▲ *Wellington XXX*

Brian Furner

▲ *Blacksmith*

and quality; crops well in milder areas; susceptible to leaf spot.

Late varieties

Baldwin: a very old variety and a good cropper; makes a dense upright bush; flowers midseason; medium-sized fruits, easy to pick and thick skinned; ripens evenly; berries hang well unless the foliage is poor, succeeds best in mild areas where it crops regularly and heavily; stands closer planting; prone to leaf spot.

Westwick Choice: very compact; flowers mid to late season; berries large and firm; ripens a few days after Baldwin and hangs well; more resistant to leaf spot than Baldwin.

Amos Black: vigorous, upright unbranched stems and dark green foliage; flowers late season; large berries on short branches; variable cropper; moderate resistance to leaf spot.

Daniels September: vigorous open bush, tends to have characteristic leaf mottle; flowers late, after Baldwin; two forms of fruit develop, early and late; the latter is the desirable form; large, thick skinned fruits, hang late for about fourteen days after Baldwin; moderate resistance to leaf spot.

Malvern Cross: similar habit to Wellington XXX; flowers late season; well berried, but tip fruits are small.

Bernard Alfieri

▲ *Baldwin*

Donald Smith

▲ *Westwick Choice*

Pests & Diseases

Unfortunately, black currants are very prone to attack by a variety of insects and diseases. However, if you make sure that your plants come from certified stock and follow a sensible preventive spray program, you have an excellent chance of a healthy crop. It is particularly important to protect your plants from infection by bud mite. Spray with 1% solution of lime-sulfur when the first flowers open, and repeat three weeks later. Malathion or derris sprays are useful against aphids, black currant sawflies, leaf midge and red spider mites. In all cases, spray exactly at the time stated; never when blossoms are in full bloom.

Bud mite: infection with this mite is responsible for the disease "big bud." The mite also transmits reversion virus (see below). These mites are minute in size and thousands of them can be found in a single infected bud. The infected bud then swells prematurely and becomes less pointed (hence the name "big bud"). There is no completely effective control but spraying twice each spring with lime-sulfur, 1% strength, at the rate of ½ pt to 6 gallons (⅓ L to 27 L) of water is a useful measure. Apply the solution as the first flowers open, and again three weeks later. Prune branches which show signs of big bud on slightly infected bushes. Badly infected bushes should be dug up and burned.

Reversion virus: this incurable virus disease is carried by the bud mite. It is difficult to diagnose leaf reversion in its early stages because the infected plant may appear no different from a healthy one, except for a reduction in cropping. In late spring or early summer, closely examine the leaves of those plants which have cropped poorly. If the plants have reversion virus, the leaf structure may have changed. Healthy leaves have five or more veins on either side of the center rib of the lobe opposite the leaf stalk. Reverted leaves have less than five. Infected plants will never recover. Remove and burn them. Plant healthy replacement stock on a different site well removed from sources of infection.

Aphids: the first sign to look for is stunted leaf growth, leaf curling and leaf distortion. Cotton woollike grubs on the roots of the infected plants are due to

GUIDE TO BLACK CURRANT TROUBLES

Symptoms	*Probable cause*
Unnaturally large, swollen buds	Bud mite
Leaf veins reduced in number, little fruit produced	Leaf reversion virus
Stunted growth, leaf curling and distortion	Aphids
Green and black caterpillars, foliage stripped	Black currant sawfly
Minute red or brown mites, yellow, stunted growth	Red spider mite
Brown spots on leaves from midspring onward	Currant leaf spot and anthracnose
Yellow pustules on undersides of leaves in early summer	Black currant rust
White felty growths on young leaves, fruits and shoots, or delicate powdery mold on underside of leaves	Mildew

currant root aphids. To control aphids, spray in midwinter with a tar-oil spray. As soon as the first flowers open, spray with malathion, thoroughly wetting the undersides of the leaves.

Black currant sawfly: the green and black caterpillars of this insect will quickly strip a plant of foliage. The damage is usually done on the underside or in the center of the infected bush. If the caterpillars appear, pick them off by hand, or give an extra spray with rotenone or malathion.

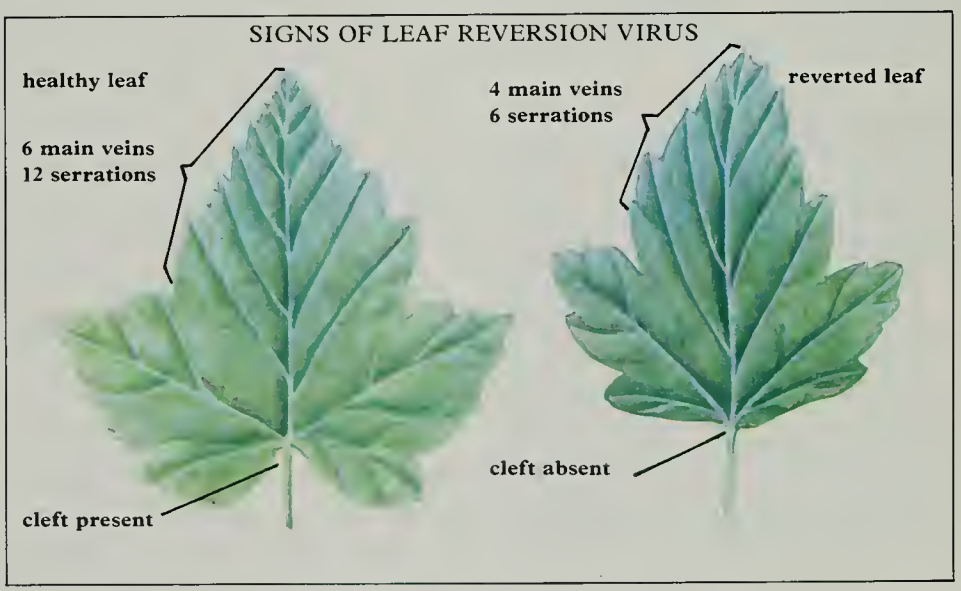
Red spider mite: these are minute red or brown mites which suck the sap from leaves, eventually weakening the plant. A sign to watch for is the rapid bronzing of leaves. Spray with a dormant oil or malathion at the first open flower stage.

Currant leaf spot and anthracnose: these fungus diseases can be fairly damaging unless kept in check. They are likely to occur in higher rain fall areas and in wet seasons. Brown spots appear on the leaves from late spring onward; if the attack is severe, the bush can be badly weakened. Premature leaf fall is an indication of infection by leaf spot. Spray the infected plants immediately after flowering and three more times at four-week intervals with an approved fungicide.

George Hyde

▲ *Black currants showing the enlarged buds of "Big Bud" trouble, caused by bud mites.*

Mildew: the symptoms of mildew are white felty growths on the young leaves, fruits and shoots. In summer and autumn, the fungal growth becomes brown



Royal Horticultural Gardens, Wisley

▲ *Severely distorted leaves caused by an attack of the common aphid.*

Ministry of Agriculture Fisheries & Food

▲ *Black currant leaves displaying a mild (left) and severe (right) leaf spot disease.*

Ministry of Agriculture Fisheries & Food

▲ *White felty growths on plants suffering from mildew.*

and feltlike. The European mildew shows itself as a delicate, powdery mold on the undersides of the leaves. Control by lime sulfur spray before the flowers open or an approved mildew control later as needed. Cut out any diseased shoots.

Cane blight: this disease can cause stems to die suddenly, even when laden with fruit. Prune promptly and burn any suspicious canes. Otherwise, dormant lime sulfur spray should be sufficient.

Caterpillars and beetles: various species also attack these plants. Spraying with nonpoisonous Sevin at the first sign of infestation should control them.

Black currant rust: the symptoms of this disease are yellow, raised pustules on the undersides of the leaves in early summer. Fungicide sprays approved in your area should control black currant rust.

Black currant leaf midge: this pest usually appears in its larval stage as whitish orange maggots which cause the leaves to twist and become folded. Seabrooks Black, Wellington and Baldwin are the most susceptible varieties of black currants. Where they occur they are sprayed at the open-flower stage.

Eelworm: damage from this pest is usually worse after a wet season. Buds will fail to open in spring, leaving long, bare branches. Daniel's and Westwick are particularly susceptible black currants varieties abroad. Eelworm is best controlled by avoiding planting on diseased ground, especially following any potato crops. A rare problem.

step-by-step growing guide

Red and White Currants

Ribes sativum (fam. *Grossulariaceae*)
Hardy deciduous bush with a cropping life of at least 15 years; up to 25 in some cases
Planting to harvesting time: two years
Size: bushes grow up to 5 ft (1.5 m) high and 4 ft (1.2 m) wide
Yield: average 7 lb (3 kg) per bush each year, but can be much more, to about 12 lb (5.5 kg)

The red currant, and its pale-fruited variety, the white currant, are excellent and tasty bush fruits. Coming at the height of the summer season, red currants served fresh with cream and sugar seem to embody all the goodness of summer soft fruit.

The smooth-skinned red currant berries have a sharp acid flavor, and because of their high pectin content are very popular for making jam. The flavor combines well with other fruit, and red currants can be added to assist the "setting" of jams and jellies. They can also be stewed, put into tarts or used in relishes.

White currants originated as seedlings of red currant bushes; the fruit of these seedlings lacked red pigment. Like white grapes, white currants are not actually white but vary in color from cream to yellow. The flavor of white currants is quite different from red currants, being sweeter and lacking in acidity. These are usually eaten raw, served with cream and sugar. Except for being slightly less vigorous than red currants, they have the same growth and fruiting habits and the same cultivation requirements.

Red currants are immensely popular and widely cultivated in Europe and in parts of the United States. Red currants give slightly lower yields per bush than black currants, but have several good points in their favor. Red and white currants do not need as rich a soil or as steady a supply of water as black currants. As long as they are properly cultivated, red currants are relatively free from pests and diseases. Lastly, red currants are much more amenable to training than black currants, which are almost universally grown as bushes. Red and white currants can be pruned to form standards, single or double cordons, espaliers or fan-shaped specimens. These trained forms take up relatively little room and are ideal for the smaller garden. Cordons, espaliers and fan-trained bushes can grow quite comfort-

Donald Smith

▲ *This red currant variety is a heavy and reliable cropper, growing as a U-cordon.*

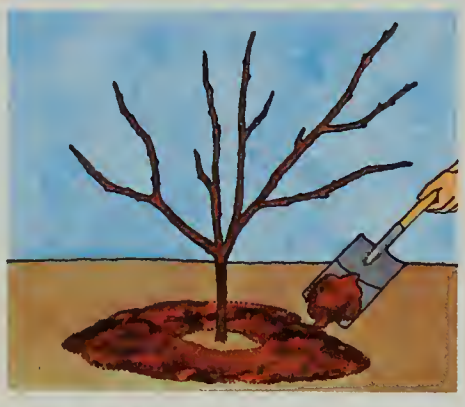
ably in a 1 ft (30 cm) wide border at the base of a wall, and standard forms can have a low-growing crop, such as lettuce or strawberries, underneath them. Standard red currants can also be grown in flower beds, where they make attractive features. Because they are self-fertile, a single bush can be planted on its own and will still give a good crop.

Because birds find red and white currants most attractive, the bushes are sometimes grown in a fruit cage. Bushes grown in the open can easily be netted during the fruiting season; those growing against walls or fences can be protected by nylon mesh netting hung from brackets fixed above the bushes.

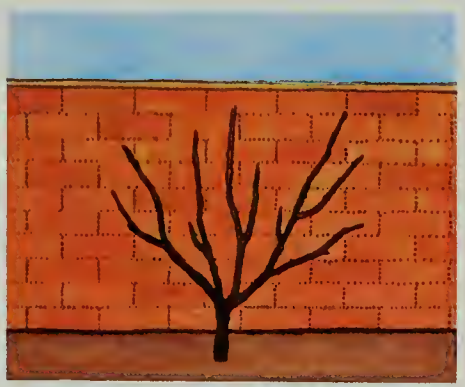
Suitable site and soil

Although red and white currants prefer a sunny position, they will grow well in partial shade. As long as there is sufficient sun they will crop reasonably well when grown against a north-facing wall. The bushes may need shelter from cold winds because insects may be unable to

SITING AND PLANTING



Plant early while the bush is still dormant; mulch with well-rotted manure, garden compost or peat.



As long as there is sufficient sun, red currants will crop reasonably well when grown on north-facing walls.

pollinate the flowers on very windy sites, and also because the young shoots of red and white currants are easily blown out. Exposure to strong winds in late spring and early summer can be particularly damaging.

Red and white currants do not need as rich a soil as black currants. They will not, however, tolerate excessively wet soils, particularly when newly planted. The ideal soil for red and white currants is light, deep, slightly acid loam which contains sufficient vegetable matter to retain moisture in summer. Lean dry sandy soils are not suitable unless they are heavily mulched and watered. Very acid or very alkaline soils will give poor yields; test your soil and correct any pH problem before planting; the soil pH should be in the region of 6.0 to 6.8.

About a month before planting, dig the soil one spit deep if it has been under cultivation; otherwise double dig it. Dig in a 2½ gal (9 L) bucket of suitable rotted organic matter for each bush about a week before planting. Work in 1 oz (30 g) of sulfate of potash per sq yd (sq m) to the top few inches (centimeters); red and white currants are particularly sensitive to potash deficiency. Get rid of all perennial weeds completely during the soil preparation, or they will be troublesome as long as the currant bushes are there.

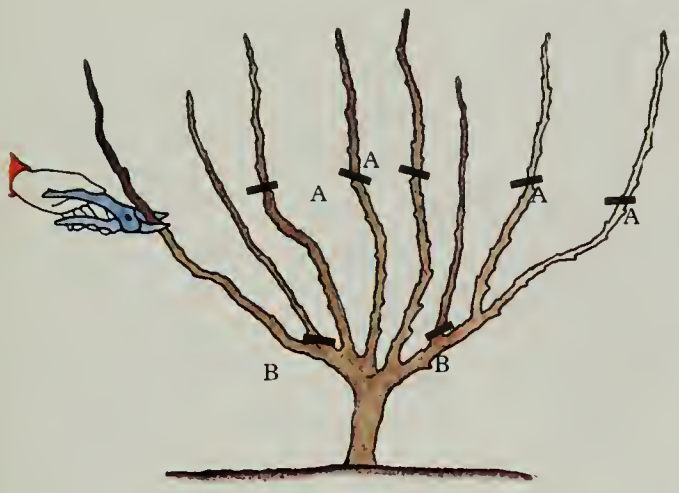
Planting

It is very important to buy young healthy bushes from a reliable nurseryman, to avoid diseased stock. Two-year-old bushes are best. These are usually grown on a short leg (trunk), like a miniature tree. However, they are extremely amenable to training, and may easily be grown as single cordons, U-shaped cordons, or double U-shaped cordons—as well as in the customary bush form.

While they can be planted as soon as dormant in the fall in mild climates, spring planting is usually preferred. Set the bushes at the same depth as they were in the nursery, as indicated by the soil mark on the stem. Spread the roots out well, cut back cleanly any which are broken or torn, and rub off any suckers on them, or buds on the "leg." Bushes should be spaced 5 ft (1.5 cm) apart each way, single cordons 15–18 in (37.5–45 cm) apart and double cordons 3 ft (90 cm) apart in the row. If planting more than one row, leave 5 ft (1.5 cm) between rows. Give cordons support at the time of planting by tying loosely with soft string to a bamboo cane.

Currants are among the hardiest of fruits—thriving in cool, moist climates but not in areas of long hot summers. In general, the best planting regions for them are north of the Washington, D.C. latitude, east of the Mississippi River and in Washington State and Oregon.

PRUNING AFTER PLANTING



Immediately after planting, cut back all main branches to half their length (A); any spindly ones should be completely rubbed out (B)

Pruning

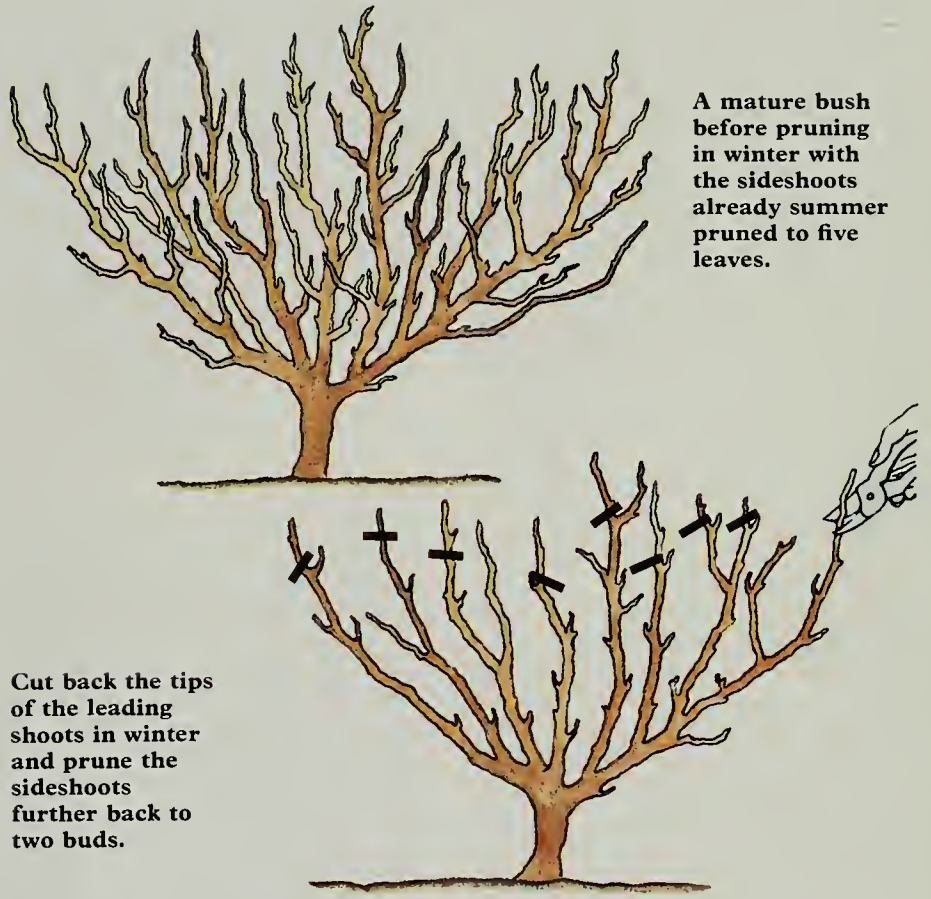
Red and white currants are somewhat similar to apples in their fruiting habits, in that fruit is formed on the spurs along permanent branches, fruiting only on wood that is two years old or older. When pruning red or white currant bushes, the general idea is to form an open-centered bush with a permanent framework of eight to twelve well spaced branches.

Begin immediately after planting by cutting back all the main branches to half their length, making each cut just beyond a bud pointing away from the center of the bush. Make sure there are three or four good buds remaining on the branch. Any weak or badly placed shoots should be completely rubbed out. This initial treatment may seem a bit severe, but if the newly planted bush is not pruned in this way, formative growth will be very slow.

If you have bought a one-year-old bush, it will have three or four branches; a two-year-old bush should have six or eight strong branches. The pruning back of these branches to half their new growth is repeated for the next one or two years, in early spring, until eight to twelve branches are formed; these will be the permanent framework of the bush. After this it is only necessary to tip the branch leaders in winter, unless harder pruning is necessary to stimulate growth. If the crops gradually diminish over several years, it is a good idea to gradually replace some of the oldest branches with new wood. Select strong replacement shoots growing from the lower half of the bush, and allow them to grow out, and cut out the old branches, either back to their point of origin, or to a suitably strong one-year-old shoot low down.

Summer pruning consists of cutting back the sideshoots along the main branches to five leaves beyond which the new growth started in early summer. Do not cut back all the sideshoots at once or the balance between leaf and root growth will be disturbed; try to spread the pruning over a period of two weeks or so, starting just as the berries are beginning to color. Summer pruning should only be done if the bushes are healthy and growing vigorously; if they are at all weak or slow growing, omit the summer pruning. Every winter, all these summer-pruned sideshoots should be cut back to the second leaf joint which by then will be a dormant bud, about 1 in (2.5 cm) from the main branch. It is not essential to summer-prune bushes, but it

WINTER PRUNING A BUSH



A mature bush before pruning in winter with the sideshoots already summer pruned to five leaves.

Cut back the tips of the leading shoots in winter and prune the sideshoots further back to two buds.

does improve cropping and results in slightly earlier ripening.

In the case of cordons, cut back the new upward extension growth by a third of its length each winter, starting immediately after planting. Where growth has been very vigorous and more than 28 in (70 cm) of new wood has been made, cut this new growth back to about 9 in (23 cm). In summer, just as the fruit shows the first sign of changing color, shorten sideshoots to five leaves and then in winter cut these back further, each to its second bud. Trained forms such as cordons and espaliers must be summer-pruned if their shape is to be retained and cropping maintained.

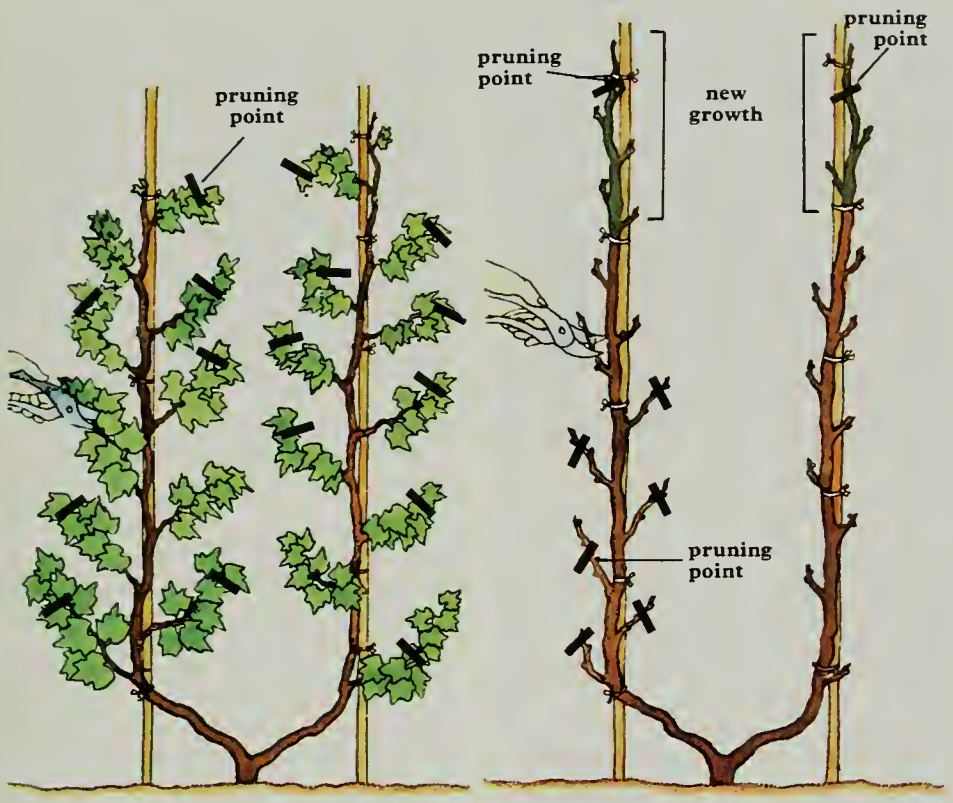
Espaliers are formed in the same way. Choose three shoots on the one-year-old such that the center one is as near the vertical as possible and the other two opposite one another, so that they can be drawn to form the first tier.

For fans, all but two opposite shoots near the top of the leg are left, and the subsequent new growth pruned to produce shoots which fill the wall or fence in a fan-shape. Standards are simply a bush form at the top of a long leg, obtained by letting the leading shoot grow unpruned to the height required, and removing all sideshoots, then treating the head like a bush.

Cultivation and care

Immediately after planting, spread a 2 in (5 cm) deep mulch of well rotted farmyard manure, garden compost, or moist

PRUNING CORDON-TRAINED CURRANTS



In summer, as soon as the fruit shows the first signs of changing color, cut sideshoots to five leaves.

In winter, cut the new extension growth by a third and shorten the sideshoots to just two buds.

peat over the root area to prevent evaporation from the soil if the spring and early summer prove to be dry. Water when the weather is particularly dry.

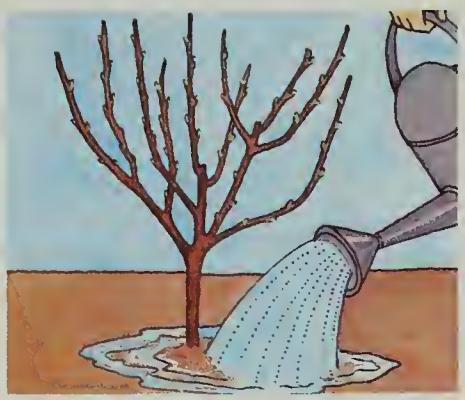
Keep the area around the bushes weed-free. Remember though that red and white currant bushes are very shallow rooted, and over-exuberant hoeing can wreck the root system. Mulching is a safer method of keeping weeds down.

Dress annually in late spring with well rotted farmyard manure. Keep the manure well away from the main stem, or "leg," when mulching, otherwise the leg may throw out unwanted sideshoots. A layer of straw on top of this will keep weeds down for the summer, and should be removed in autumn to avoid providing nests for mice.

In very light or other soils deficient in potash, apply sulfate of potash at the rate of ½ oz per sq yd (15 g per sq m) in late winter. Bonfire ash can be applied instead of sulfate of potash at up to 8 oz per sq yd (240 g per sq m) depending on the percentage of wood burned. Where farmyard manure is unobtainable, you can give a complete fertilizer according to the manufacturer's instructions, but do not use fertilizers excessively rich in nitrogen, or unhealthy, lush and sappy growth may result.

Bushes that are planted in the fall are vulnerable to being jolted out of the soil as the ground freezes during that first winter. To prevent this, earth-up the soil around each plant to a few inches in depth to give extra stability.

AFTERCARE OF BUSHES



If the weather is dry, water the bushes well; follow watering with a mulch to retain moisture.

In late winter, sprinkle a layer of bonfire ash around the bush to supply potassium.

Harvesting

The first small crop can be taken in the second summer after planting, but it is better to remove the flowers in spring and wait another year, to let the bush strengthen. Picking can start in early summer, and can continue through to late summer, according to the variety planted. Do not be in a hurry to pick your crop; red currants are slower to ripen fully than their rapid coloration suggests. Because the fruit does not ripen all at the same time, inspect your bushes every few days, even daily in fine weather, to harvest the ripe berries.

Pick the fruits of both red and white currants in complete little bunches, not individually. Ideally, picking should be done when the fruit is dry. Any currants picked in rainy weather should be used quickly, as wet currants rapidly deteriorate. You can either use scissors to cut them or nip off the stalk at the top between your fingernails. Do not tear them off, as this damages the wood. Berries on their stems keep a few days longer than those without them.

Propagation

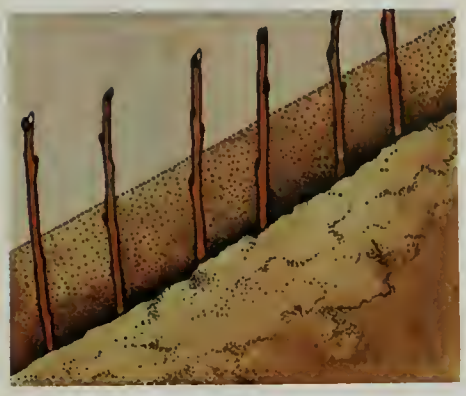
New red or white currant bushes can easily be obtained from cuttings taken in early to midautumn from the current year's growth. However, there is little point in propagating from diseased or infested bushes, as the new plants will be doomed from the start.

Unlike black currants, red and white currants are usually grown on a clear stem, or leg; for this reason cuttings have to be longer than those for black currants. Well ripened shoots about 15 in (37.5 cm) should be adequate. In order to be sure that you get a good clean stem without sideshoots or suckers below ground, rub out all but the top three or four buds. At the same time cut off the unripened wood at the tip, about 3–4 in (7.5–10 cm) long, as it would wilt and probably die back before new roots have formed.

Insert the cuttings into a 6 in (15 cm) deep slit trench, spacing them 8 in (20.5 cm) apart. For a quick, smooth operation, dig and prepare the trench before taking cuttings. Unless your soil is very sandy, it helps encourage rooting if you first sprinkle a little river sand along the bottom of the trench. Return the soil to the trench and press firmly around the cuttings. It is unlikely that you will need more than one row for cuttings, but if you do, space them at least 2½ ft (75 cm) apart.

During the winter, check that none of the cuttings have been lifted by frost; firm any down which have been lifted.

PROPAGATION



Take cuttings of current year's growth in autumn, and insert them in a shallow trench to root.

See that the cuttings never lack water during the following spring and summer, and that weeds have no chance to choke them. A mulch of garden compost is useful in that it keeps weeds down and also helps conserve soil moisture. By the winter of the next year, the cuttings should have rooted, produced shoots and be ready for transferring to their permanent positions the following spring. If the plants look at all weak or thin, however, it is best to leave them in the nursery bed for another season before transplanting.

If the plants are to be grown as bushes, prune all the one-year-old branches back by half; for single cordons cut back sideshoots to two buds and the main leading shoot back by one-third. For a U-cordon, choose two opposite sideshoots to form the base of the U, and to which you then cut back the central stem; let uprights develop at suitable places.

If you do not plant fall cuttings immediately, they can be stored by being tied in bundles and buried, thick ends up, in the ground and planted later or held until spring. If you do plant cuttings in the fall, remember to mound-up loose soil around them to prevent lifting by winter's frost action in the soil. When replanted in their permanent site, set young plants 2 in (5 cm) deeper than they were as cuttings.

Freezing tips

When your currant bushes are strong enough to bear a good crop of fruit, you can look forward to eating them all year round because currants can be preserved in your freezer without too much trouble. Keep in mind that for best results they should be fully ripe, bright in color and plump and should be frozen soon after harvesting. Be sure not to use galvanized ware (iron or steel coated with zinc to prevent rust) in preparing fruits. The natural acid in fruits will dissolve the poisonous zinc and taint the fruit.

Whole fruits are syrup-packed when they are intended for later use as desserts. If fruits are to be used for cooking, dry sugar or unsweetened packing are usually best. Currants are among the fruits that preserve quality equally well packed with or without sugar. They can also be frozen in crushed form—a good way to use up good parts of less perfect fruit—to which sugar is added, or as juice or to make jelly.

Exhibition tips

Exhibiting red or white currants is fairly straightforward; they are shown in exactly the same way as black currants. No more than 1 lb (0.5 kg) in weight of red or white currants may be shown; these should of course be of the same variety. When picking for the show, select double this weight, so that you have reserves in case you need them at the show bench. Choose the longest stems having the largest, fully ripe berries; the judges will look for bunches with large, ripe and uniform berries on fresh stalks. Bunches with berries obviously missing, or with small, overripe, underripe or unevenly ripened berries will not win prizes, nor will those which have shriveled stalks.

Currants are normally displayed on a plate, with the stems laid out parallel to one another. To get the best visual effect, it is a good idea (where permitted) to fill the well of the plate with soft white tissue paper, covered with a single piece of paper with ends tucked under the plate; the mounded up berries will be more attractive.

Varieties

Unfortunately, not many varieties are available from the American nursery trade. Those most likely to be found are:

Red currant
Perfection: large, midseason. Originated in New York; not as widely adapted as Red Lake but worth trying.
Red Lake: from Minnesota: large, in long cluster, vigorous, hardy and productive. Midseason to late.
Wilder: an old commercial variety; midseason. Medium-sized; from Indiana.

White Currant
White Grape: fruit ivory white; an interesting novelty from abroad.

Varieties abroad
The red currant has never become as important a fruit in America as it is in Europe and it is not widely cultivated here except in a few areas. The fruit is native to western Europe and has been cultivated there as a popular fruit since the sixteenth century. For this reason, European gardeners have a greater choice than Americans of currant varieties—chiefly red, but also some white types. Some of those to be found are:

Harry Smith

▲ *Red Lake*

Earliest of Fourlands: bright red berries in long bunches; strong growing bush, needs plenty of space; reliable cropper.
Fay's Prolific: very attractive scarlet berries carried in loose sprays; very sweet flavored; heavy crops borne on small compact bush.
Raby Castle: medium-sized berries; heavy cropper on large upright bush; subject to mildew.

G. E. Hyde

◀ *Perfection*

Donald Smith

▲ *Earliest of Fourlands*

Donald Smith

▲ *White Grape*

Jonkheer Van Tets: medium-sized berries deep red color, slightly acid flavor; heavy cropper; bush moderately vigorous and upright in growth.

Wilson's Long Bunch: heavy crops of medium-sized fruit; sprawling bush that is suitable for fan training.

Laxton's No. 1: large, bright red fruits borne on medium-sized compact bush; do not plant on sites exposed to wind as the shoots can be damaged; berries with superb flavor; excellent for making jam.

White Dutch: very pale, milky white fruit carried in short bunches; good flavor and reliable cropper; fruits can be eaten raw.

White Versailles: fruit large and yellow, very sweet tasting; bush large and upright; heavy cropper; popular white variety.

Bernard Alfieri

➤ *White Dutch*

Pests & Diseases

Do not be discouraged by the following list of pests and diseases. Although theoretically red and white currants are vulnerable to attack by all of the pests and diseases listed, it is very unlikely, as long as your plants are in good health, that you will encounter more than one or two of these problems. Should any symptoms appear, identify the cause and take corrective measures as soon as possible, before the infection or infestation has time to do serious damage.

White pine blister rust: this is the most serious enemy of currants and also gooseberries. They should not be grown in regions inhabited by white pine—a tree of eastern North America with needles in clusters of five. For information about possible white pine growth in your area, check with your state university.

Birds: the ripe fruits are very attractive to birds, particularly pigeons and various fruit eaters; in bad years the entire crop can be quickly stripped. Although scarecrows provide temporary protection, the most effective method of protection is to net the bushes or grow them in a fruit cage. Those branches which have been largely stripped of buds should be cut back to a strong, healthy bud near the base, as the wood stripped of buds would remain permanently bare and never crop.

Aphids: the first sign to look for is stunted, curled leaf growth, followed by honeydew and sometimes sooty mold on the leaves and developing berries. A commonly found aphid on red currants is red currant blister aphid, which feeds mainly on the leaves, to produce very marked reddish blisters on the leaves. Although disfiguring, damage is mild, compared to that of other aphids, whose feeding stunts the new shoots. To control aboveground aphids, spray in midwinter, while the plants are dormant, with a dormant oil to kill the winter eggs. Alternatively, in spring, when the first leaves open, spray with rotenone or malathion, thoroughly wetting the undersides of the leaves, and repeating as necessary at about ten-day intervals (not at flowering).

Caterpillars (sawfly): the caterpillars of the gooseberry sawfly also attack red and white currant bushes. There can be up to three generations of sawfly in one season and the green and black caterpillars will quickly strip the plant of foliage. The worst damage is done on the underside or in the center of the bush. Pick off the caterpillars by hand in mild infestations;

Royal Horticultural Society

Unsightly red blisters caused by the red currant blister aphid.

G. E. Hyde

Gooseberry sawfly caterpillars can strip the foliage of red and white currant bushes.

in severe cases, spray with rotenone, malathion or Sevin.

Cane blight: a symptom is the sudden wilting of the leaves of whole branches in spring or summer, or even entire bushes. This is due to the infection entering the branch or central stem of the plant. Old and weak plants are most vulnerable, so the best preventive measure is to keep your bushes healthy and well cultivated. Cut off and burn any infected branches back to healthy growth, and paint over the wound with a protective paint. Then spray with a fungicide approved by state and federal authorities. If the whole bush is infected, it is best to grub it up and burn it, as it will never recover.

Scales: San Jose and other scales are controlled by the dormant oil sprays already mentioned.

Tent and woolly bear caterpillars: if present, simply pick off or spray with Sevin or malathion.

Leaf spot: this is another disease which affects both gooseberries and currants. The main symptoms are small, black dotlike spots; if the infection is severe, the spots will eventually join up, the leaves will turn yellow and wither, and then fall prematurely. Rake up and burn all fallen leaves and remove infected leaves from the bushes. If the attack is severe, spray with a state- and federally-approved fungicide after removing infected leaves and again two weeks later, and follow the manufacturer's directions with regard to precautions.

Black pustule disease: this fungal infection attacks gooseberry also, although red currant bushes seem to be the most vulnerable. The infection usually enters the bush through a pruning wound and the symptoms are oval, dark wartlike pustules which appear on infected branches. If the whole bush is infected, it will die; mild infections can be dealt with by cutting off and burning the infected branches. Always cover large wounds or pruning cuts with a coat of protective sealer.

Gooseberry mildew: American and European gooseberry mildews occasionally attack currant bushes. The symptoms of American gooseberry mildew are white powdery patches on the young leaves, and on fruits and shoots. In summer and autumn, the patches become brown and feltlike. European mildew shows itself as a delicate powdery mold on the upper sides of the leaves and, very rarely, on the berries. Control both kinds by dor-

Ministry of Agriculture, Fisheries & Food

▲ *A severe fungus infection can kill the bush, so cut out infected branches.*

Ministry of Agriculture, Fisheries & Food

▲ *In a severe case of leaf spot, the small black dots appear on the fruit and leaves.*

mant oil as well as an approved mildew control when in growth. Cut out and burn any diseased shoots.

Coral spot (Nectria cinnabarina): this is a fungus disease affecting many types of shrubs and trees. Also called twig canker, it commonly grows on dead wood, but as a weak parasite it occasionally attacks living wood causing cankers. Recently pruned or weak plants are especially vulnerable to attack. All dead shoots must be cut off at least 2–4 in (5–10 cm) below apparently diseased areas and destroyed. Promote strength in plants with proper feeding, mulching and watering; soil drainage may be necessary, too. Spray with a fungicide recommended for control of this fungus.

Botrytis cinerea (gray mold): this common fungal infection attacks many varieties of fruit and ornamental trees—in greenhouses as well as outdoors. The main aboveground symptoms are sudden wilting of entire branches, often in full leaf, plus rotting stems, with a gray mold covering the affected areas. If the fungus attacks the main stem, the whole plant may die. The infection usually enters the bush through a wound or pruning snag, so careful cultivation and pruning are the best preventive measures; always paint over large wounds with a fungicidal paint. Plants grown too close together or whose branches are crowded are more likely to be infected, especially in cool wet seasons. Moderately infected bushes can be saved by cutting back into living wood; badly infected bushes should be dug up and burned. Avoid overcrowding.

Wilt: verticillium wilt is widespread in North America and affects a wide variety of plants, including fruit trees and bushes. It is a soil-borne disease that causes gradual yellowing and drooping of leaves starting low down on the plant, followed by leaf loss and stunted growth. Dig up and destroy infected plants and do not use the infected soil for currants or other susceptible plants.

Mites: currant plants are also vulnerable to attacks from the two-spotted spider mite—the commonest of the red spider mites. This minute insect is a problem to many plants in greenhouses and outdoor gardens all over the world, thriving under hot, dry conditions. Plant leaves become distorted and off-color and marked with tiny silver dots. Control with a recommended miticide, spraying weekly as needed. Water the plants well when weather is especially dry.

GUIDE TO RED AND WHITE CURRANTS TROUBLES

Symptoms	*Probable cause*
Ripe fruit eaten; buds taken in winter	Birds
Leaves curled and discolored, new shoots stunted, blisters on leaves	Aphids
Leaves with large holes; mid-rib remaining	Caterpillars
Whole branches wilt and die	Cane blight
Black pustules on bark of branches	Black pustule disease
White patches on leaves, stems and fruit	American gooseberry mildew
Powdery mold on upper side of leaves	European gooseberry mildew
Small black dotlike spots on leaves	Leaf spot
Small, scalelike "growths" on stems	Various scale insects